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ABSTRACT

Skill deterioration and retraining needed to support mobilization were determined for Individual Ready Reservists (IRRs) in 16 critical Navy ratings. Mailed questionnaire were used to obtain job performance information (tasks performed and proficiency associated with their performance) from IRRs and active duty personnel. Skill deterioration was determined by differences in proficiency reported by IRRs for two different points in time: when they were separated from active service and at the time they completed the questionnaire. Retraining needs were derived by comparing IRR estimates of their current proficiency on job tasks within their rating to the same type of estimates made by current active duty personnel. Study results indicated that skills previously acquired on active duty deteriorate during the time personnel are assigned to the IRRs. Much less deterioration occurred for individuals who work in civilian jobs related to their Navy rating. For most of the ratings, the current proficiency levels of IRRs compared favorably with the proficiency levels reported by individuals currently on active duty. It appeared that the typical IRR should be able to perform most job tasks of his/her rating at mobilization after brief familiarization such as would be provided by direct, corrective supervision. (Appendixes, which form the bulk of the document, include job descriptions, cover letters, and study results for 16 ratings.) More than 100 data tables are contained in the document. (Author/YLB)

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TECHNICAL REPORT 86-007

SKILL DETERIORATION AND RETRAINING NEEDS OF NAVY INDIVIDUAL READY RESERVISTS

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June 1986

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Skill deterioration and retraining needed to support mobilization were determined for Individual Ready Reservists (IRR) in 16 critical Navy ratings. Mail-out questionnaires were used to obtain job performance information from IRR and active duty personnel. Skill deterioration was determined by differences in proficiency reported by IRRs for two different points in time: (1) When they were separated from active service, and (2) at the time they completed the questionnaire. Retraining needs were derived by comparing IRR estimates of their current proficiency on job tasks of their rating to the same types of estimates made by current active duty personnel. The study results indicated that skills previously acquired on active duty deteriorate during the time personnel are assigned to the IRR. Much less deterioration occurs for individuals who work in civilian jobs related to their Navy rating. The need for retraining to restore lost skills to acceptable proficiency levels was identified for five of the ratings.

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- The Individual Ready Reservists and the active duty enlisted personnel and their commanding officers.

EXECUTIVE SUMMARY

INTRODUCTION

Acting under the FY86-90 Defense Guidance (DG), the Deputy Chief of Naval Operations (DCNO) for Manpower, Personnel, and Training (MPT) initiated a program to assess technical skills of Navy Individual Ready Reservists (IRR). Participation of the Naval Training Systems Center (NAVTRASYSCEN) was requested. Specifically, NAVTRASYSCEN (Code 10) was requested to study and analyze the deterioration of Navy skills acquired on active duty during time spent in the IRR. In accordance with the DG, analysis of skill deterioration was to determine retraining needs of the Navy IRR to maintain the minimum proficiency required to support mobilization.

APPROACH

Skill deterioration and retraining needs were assessed for 16 critical ratings (see appendix A). These were considered critical based on the criterion of projected personnel shortfalls for mobilization. Questionnaires were used to obtain job performance information (tasks performed and proficiency associated with their performance). Data were obtained from both IRR personnel and from E-4s currently on active duty in the ratings. Proficiency was defined in terms of the degree of supervision needed to perform job tasks. Information concerning current civilian employment was also obtained from the IRRs.

IRR respondents estimated their proficiency on rating job tasks at their End of Active Obligated Service (EAOS) and at the present time (NOW). Differences between EAOS proficiency and NOW proficiency provided the measures of skill deterioration. Active duty personnel working at the E-4 level of their rating estimated their current proficiency on rating job tasks. The E-4 level was selected to provide a working definition for the DG concept of "minimum proficiency to support mobilization." Thus, differences between the current proficiency level of the active duty E-4s and the IRR rating groups provided the basis for determining if training was needed to bring the IRRs to an acceptable proficiency level before mobilization.

Specific findings about skill deterioration and IRR retraining needs, for the 16 individual ratings studied, are presented in 16 annexes to appendix D of this report. The annexes identify IRR refresher and maintenance training likely to be needed to support mobilization, and the specific job tasks of each rating that training should emphasize. Skill upgrade training needs are also discussed for each rating. General findings and conclusions that pertain to the overall group of ratings studied are presented below.

FINDINGS AND CONCLUSIONS

General findings and conclusions are given for three areas: Data base, skill deterioration, and IRR training needs.

Data Base

Several study findings indicated that the Navy IRR data files may be incomplete or inaccurate in a number of areas. These deficiencies can lead to incorrect estimates of the IRR manpower that can be mobilized. Problems apparently exist in both file content areas and in the procedures used to maintain currency of the files. Specific findings supporting this conclusion were:

- Approximately 30 percent of the mailing addresses listed for IRRs in the six Cryptologic Technician (CT) ratings were incorrect (range 28 to 40 percent).
- Approximately 10 percent of the addresses for the other 10 ratings were incorrect (range 6 to 15 percent).
- Based on questionnaires returned, an estimated 5 percent of IRRs who did not return questionnaires may not be in the viable manpower pool because they have, for example, reenlisted, passed their 60th birthday, received final discharges, died.
- In a number of ratings (notably the CT group), far fewer names of IRRs completing Military Service Obligations (MSO) were listed than would be expected considering service separation rates.
- Many IRRs (61 percent) in the ratings studied had already completed their MSO of 2 years. If individual agreements with these personnel are not on file, they are beyond the zone of involuntary recall for mobilization.
- "Last Release from Active Duty" information needed to purge files and issue discharges was not contained in the IRR data files for approximately 7 percent of the names in the samples drawn.

Skill Deterioration

As measured by differences in proficiency reported for EAOS and current proficiency, skills acquired on active duty do deteriorate during IRR membership. Considerably less deterioration occurred for those IRRs who, after EAOS, worked in civilian jobs related to their Navy ratings. The skill deterioration that occurs does not appear to be a major, general problem insofar as dictating needs for comprehensive retraining of IRRs to support mobilization. For most of the ratings, the current proficiency levels of IRRs compared favorably with the proficiency levels reported by individuals who are currently on active duty. Thus, the typical IRR should be able to perform most job tasks of his rating at mobilization after brief familiarization such as would be provided by direct, corrective supervision. However, skill deterioration effects were sufficient in five ratings to indicate some formal IRR retraining needs.

IRR Training Needs

Retraining needs for IRRs in two ratings could not be determined because of small sample sizes. Formal retraining and maintenance training for all IRRs in three ratings and for those IRRs in two other ratings who are not currently working in civilian jobs related to their rating may be necessary to support mobilization. A specialized curriculum emphasizing selected rating job tasks appears desirable. Skill upgrade training should be considered for all IRR personnel who have been off active duty for greater than 3 years because of probable changes to equipment, procedures, and materials used in job performance. For all other IRRs in the ratings studied, retraining and maintenance training prior to mobilization appear to be unnecessary. Familiarization training at recall consisting of supervised practice may suffice.

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SECTION I

INTRODUCTION

BACKGROUND

Following a first tour of active duty, Naval personnel who do not elect other service options are assigned to the Individual Ready Reserve (IRR) to complete a Military Service Obligation (MSO). Other former service personnel may enlist in this Reserve. By its nature, the IRR constitutes a pool of trained manpower. It is a principal mobilization asset, and all within the IRR may be involuntarily recalled to active duty in the event of national emergency.

IRR members, typically, do not drill. Thus, they receive no deliberate practice on the skills they acquired while on active duty. Thus, a concern of mobilization planners is that these previously-acquired skills may deteriorate during IRR membership to the point where a reservist could not make an effective contribution to a receiving unit's mission.

In recognition of the skill loss problem, the fiscal year (FY) 86-90 Defense Guidance (DG) required the military services to develop and program refresher training as necessary to maintain the minimum IRR proficiency to support mobilization. Accomplishment of the DG tasking called for a determination of IRR skill proficiency degradation and refresher training for skills considered most critically needed for mobilization. Subsequent to issuance of the DG, the Deputy Chief of Naval Operations (DCNO) for Manpower, Personnel, and Training (OP-01R1), requested the Naval Training Systems Center (NAVTRASYSCEN) study and analyze the degradation of skills attained by Navy IRR personnel while on active duty.[1]

PURPOSE

The purpose of the study was to assess the deterioration of critical Navy skills during the time individuals are assigned to the IRR. The need for training to maintain skills and/or to restore or upgrade skills to minimum proficiency to support mobilization was also to be determined. Implicit in the tasking was the additional requirement to define minimum, or acceptable, proficiency. Of most interest to CNO were individual ready reservists separated from active service less than 3 years.

ORGANIZATION OF THE REPORT

The remainder of this report is presented in five sections and four appendices. Section II presents the technical approach to the study. Overall results concerning the evidence for skill deterioration and needs for retraining are given in section III. These results are general and apply across all 16 ratings studied. A discussion of these results and interpretations possible from the data are provided in section IV. Section

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[1] CNO ltr Ser 113E/368974 of 28 Nov 83 (NOTAL).

V presents study conclusions. Recommendations concerning training for IRR members to support mobilization are given in section VI.

Appendix A provides brief descriptions of the jobs performed in each of the 16 ratings studied. Appendix B identifies activities visited for information needed for the study. Copies of the various cover letters used to transmit questionnaires are provided in appendix C. Appendix D contains 16 annexes. Each annex is a stand-alone document that treats one particular rating (e.g., Hospital Corpsman, Electrician's Mate). The annexes are identically formatted. Each contains a brief introduction and a succinct description of the study approach. Results particular to the given rating are presented. The results are discussed and conclusions concerning skill deterioration and training needs for the rating are provided. Recommendations based on the conclusions are also presented.

SECTION II

TECHNICAL APPROACH

This section presents the technical approach to the study. A brief orientation is presented first. This is followed by discussions of the procedural steps accomplished to conduct the study.

STUDY ORIENTATION

The orientation below provides definitions needed to guide the study effort and describes information needed to meet study objectives.

Definitions

The terms "critical skills" and "acceptable levels of proficiency" required definition at the outset of the study. Critical skills have previously been defined in a number of ways; for example, as those skills that must be performed correctly, either to avoid hazards to personnel or equipment, or to assure effective mission performance. For this study, however, "critical skills" were defined by OP-01R1 to mean critical "ratings" (i.e., Navy jobs). Critical ratings were further defined as those ratings for which sufficient numbers of personnel were projected to be not available for mobilization. Sixteen ratings expected to have the most serious mobilization shortfalls were selected by OP-01R1 for the study:

- Aviation Electronics Technician (AT)
- Builder (BU)
- Cryptologic Technician (Administration) (CTA)
- Cryptologic Technician (Interpretive) (CTI)
- Cryptologic Technician (Maintenance) (CTM)
- Cryptologic Technician (Communications) (CTO)
- Cryptologic Technician (Collection) (CTR)
- Cryptologic Technician (Technical) (CTT)
- Electrician's Mate (EM)
- Equipment Operator (EO)
- Electronics Technician (ET)
- Fire Control Technician (Surface Missile) (FTM)[2]
- Gas Turbine System Technician (Electrical) (GSE)
- Hospital Corpsman (HM)
- Operations Specialist (OS)
- Sonar Technician (Surface) (STG)

Brief descriptions of the jobs performed by individuals in these ratings are presented in appendix A.

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[2] All Fire Control Technicians are now subsumed under the designation of "FC." Since we examined only one FC subset, the FTM designation is maintained throughout this report.

"Acceptable level of proficiency" was not as readily definable as critical skills. In a general sense, acceptable proficiency refers to the ability of a recalled ready reservist to make an effective contribution to a receiving unit's mission. In a more specific sense, it refers to ability to perform a defined set of job tasks at a defined level of competency. Such specific information was essential to the study, both to establish a baseline for assessing skill deterioration and to define the terminal goals (i.e., specific performances) that any proposed training regimen should attempt to achieve. This information was not readily available and considerable work was required to generate it. This effort is described in detail below under our description of the questionnaire development phase of the study.

An additional early study requirement was to select a level or rate within each rating for which acceptable proficiency (job task and competency level) information would be developed. Different rates; i.e., pay grades, within a rating may perform different tasks. Alternately, they may perform the same tasks, but at different levels of competency. After consultation with OP-01R1, the E-4 level of each rating was chosen. This selection was based on the belief that IRR personnel in the majority of the ratings would have achieved this level prior to separation from active duty. Thus, the E-4 level provided a reasonable baseline for assessing skill deterioration. It was further believed that IRR personnel who could perform at the E-4 level upon return to active duty under mobilization orders could make positive and effective contributions to the missions of their receiving units. This belief was subsequently endorsed by Naval Education and Training Command (NAVEDTRACOM) subject matter experts (SME) who provided initial job task and competency information for the study.

Information Requirements

Assessment of skill deterioration requires that measures of proficiency on job tasks be available at two different points in time. Conventionally, the first measure is taken at a point when proficiency is quite high, typically at the end of some training regimen or when an individual(s) has been routinely performing job tasks. The second measurement is taken after a period of nonperformance of job tasks. The difference in measured proficiency reflects the amount of skill deterioration that has occurred over the elapsed time interval.

In theory, a number of methods could have been used to obtain the required measures. Many of the more desirable methods could not be employed, however, for practical reasons. For example, there is a lack of readily available objective tests. Time and cost considerations precluded their development. Neither was it possible to assemble groups of IRR members at central locations for assessment by testing, interviewing, or other appropriate means. Consequently, the decision was made to use mail-out questionnaires to obtain the required data. Skill deterioration would be represented by the difference between the IRR respondents' reported ability to perform required job tasks at the end of their active obligated service (EAOS) and their estimates of current (i.e., NOW) proficiency.

Information, comparable in form to that obtained from IRR personnel, was also needed from active duty E-4s. This would reflect the tasks that are performed on active duty and the competency/proficiency with which they are performed. Thus, it, by definition, constitutes E-4 criterion performance. Accordingly, IRR information could be compared to this baseline for assessing skill deterioration and, more importantly, training needs. Training needs would be determined by the differences between the current proficiency of the IRR group and the current proficiency of active duty personnel now working in the same rating.

The above discussion provides definitions that guided the study and describes information needed to meet the study objectives. The procedural steps followed are described and discussed below. These included conducting a brief literature review, developing data collection questionnaires, developing necessary job task information, administering the questionnaires, and analyzing data.

LITERATURE REVIEW

Early in the program, a review of studies completed within the past 10 years dealing with retention, skill maintenance, or retraining of military technical skills was accomplished. The review focused on studies that covered retention intervals of up to 3 years. This period corresponded to the time personnel of principal interest were assigned to the IRR.

There was no intent to produce a scholarly resume of skill retention research. A number of recent, competent, comprehensive reviews of this literature are already available (e.g., Annett, 1977; Hagman & Rose, 1983; Hurlock & Montague, 1982; Schendel, Shields, & Katz, 1978). Information contained in these reviews was used to acquaint the project staff with current knowledge about skill retention/deterioration. This familiarity was desirable to permit interpretation of the IRR study findings against the background of current knowledge to determine if additions could be made to this knowledge through the collection and analysis of data, and to make readily available information that would be useful for subsequent recommendations for training to restore lost skills.

Unfortunately, the vast majority of studies examined dealt with far shorter time intervals than are typical for IRR members. They were also concerned with issues that are not directly relevant to this IRR skill deterioration study. Most were concerned, for example, with studying retention as a function of: prior conditions such as differences in the amount of previous training, type of method used in training (e.g., frequent testing, lectures), task integration or task organization variables (e.g., how steps in a procedure relate to subsequent steps), nature of the material learned (e.g., knowledge versus skill tasks).

The results of such studies have implications both for the prediction of skill loss and for the design of training to minimize retention loss over time. These results should be appropriately considered in choosing alternative methods to retrain lost skills, particularly if there is an interest in minimizing subsequent skill loss (i.e., after retraining has occurred).

However, the present study was concerned with assessing the amount, nature, and implications for retraining of skill deterioration. It was not directly concerned with the effects of manipulating training variables to influence skill losses.

Two salient findings, however, emerged from the literature that do have relevance to the present study:

1. Skill deterioration may be at a maximum after about 1 year of nonuse of the skill (e.g., Wick, Millard, Cross, Ruffner, Keenan, Everhart, & Bickley, 1984). This finding can affect recommendations for skill maintenance training.

2. Relearning, to restore lost skills, requires about one-half of the time required to learn the skills initially (e.g., Annett, 1977; Naylor & Briggs, 1961). This finding has obvious implications for time and other resources required for retraining (or refresher) training.

QUESTIONNAIRE DEVELOPMENT

This subsection describes the work accomplished to develop questionnaires for use with both IRR personnel and active duty personnel. Constraints placed on this development are presented first. Details of development of job task statements for questionnaire use are then given. Response options and background questions used on questionnaires are also discussed.

Constraints

Constraints/qualifications placed (by the project staff) on the questionnaires were that:

1. Each should contain a sufficient number of concisely stated, technically accurate job task statements to represent fairly the specific Navy job performed by E-4s in the given rating.

2. Each questionnaire, to the extent compatability with 1 above could be achieved, should be limited to one page. It was believed, based on inputs from local Navy recruiters, that this measure would enhance the return rate from a population (of IRR members) over which the Navy has no effective motivational controls.

3. Response options selected for use on the questionnaires should be stated in terms familiar to Navy personnel and, accordingly, permit easy selection of alternatives.

4. No classified information could be contained on any questionnaire.

Job Task Information

To determine if skill losses occurred during IRR membership, it was first necessary to determine what skills (tasks) these individuals performed on active duty and how well they could or should have been able to perform them. Subject matter expert (SME) assistance was needed. For all ratings except HM, the required SME assistance was obtained from NAVEDTRACOM "A" Schools. Coordination was effected with the Chief of Naval Education and Training (CNET) and three functional commanders (Chief of Naval Technical Training; Commander, Training Command, U.S. Atlantic Fleet; Commander, Training Command, U.S. Pacific Fleet) to obtain this assistance. For the HM rating, SME assistance was obtained from the staff of the Navy Hospital at Orlando. Activities visited are identified in appendix B.

The same procedure was used in all 16 cases to develop job task statements and to obtain proficiency level information. As a first step, complete Job Task Inventories (JTI) were obtained for all 16 ratings from the Navy Occupational Data Analysis Center (NODAC). Information detailing the percentages of individuals at each rating level (i.e., rate; e.g., E-4, E-5, E-6) performing the separate tasks was included. The Occupational Standards and Personnel Advancement Requirements (PAR) for each rating were also obtained. The Occupational Standards, derived from the JTIs, list typical (i.e., standard) job tasks performed by individuals in a rating. The PARs list job tasks on which individual proficiency must be demonstrated before he/she can be promoted to a given pay level (e.g., E-4) or rate (e.g., HM-3) within a rating. The JTIs, Occupational Standards, and PARs were the basic items used to develop job task statements.

Sixteen activities, one per rating, were visited for SME assistance (appendix B). Prior to a visit to any particular site, the project staff prepared a preliminary list of job tasks for the rating in question. The top 50 percent, as determined by the percentage of E-4s performing, of technical job tasks was extracted from the JTIs. These were compared to the Occupational Standards, and duplicate tasks were eliminated. The preliminary list, the complete JTI, the Occupational Standards and the PARs for each rating were taken to the field for use there. Because of the working convenience afforded by the proximity of the Naval Hospital at Orlando, HM job task information was developed first. The resulting prototype questionnaire instrument was also taken to the other 15 activities as an example of the type and level of information desired.

At each activity visited, a standard procedure was followed. After receiving a project briefing, SMEs, typically five at each activity, reviewed the preliminary E-4 job task list and the Occupational Standards. They were instructed to select those tasks that in their collective opinion best represented the job that they would want a reservist returning to active duty to be able to do. They were further instructed to, and did, eliminate tasks considered nonessential (e.g., administrative tasks) in a mobilization situation, combine tasks where it was reasonable to do so, eliminate duplications, and to improve task wording where desirable/ necessary for clarity or accuracy.

The SMEs, continuing to work in committee, next reviewed the PAR task statements for the E-4 and E-5 levels of the rating, adding those they felt were appropriate and/or otherwise revising the list previously selected. SMEs next reviewed the complete JTIs for the rating in question, drew on their own past experiences, reviewed the "A" School course outline and any other materials that they had brought to the meeting. In all instances, tasks considered essential for performance by an E-4 were added to the list. From this process, a master list of tasks, its principal basis being the rating E-4 PAR, was compiled. This list represented the E-4 job generally performed across a rating rather than a job specific to a given Navy enlisted classification NEC. Questionnaires designed for use with specific NECs were not desirable since it was known that too few IRR members with given NECs were available to justify use of NEC specific instruments.

When the panel of SMEs was satisfied with the task list--these were the tasks they wanted a returning E-4 reservist to be able to perform--they were then asked to indicate the level of proficiency they felt the returning reservist should bring to the job. For this, the SMEs independently assigned a value to each task according to the following criteria:

1. Cannot do without supervision.

2. Can do with general supervision.

3. Can do with occasional supervision.

4. Can do without supervision.

5. Can do extremely well without supervision.

After making their independent ratings, the SMEs discussed each task and either did or did not change their assessments depending on their own convictions. Finally, the SMEs, following the same basic procedure, estimated the level of skill that an individual would be expected to have if he had not performed a given task for 2 years.

The purpose of obtaining these assessments was twofold. The first was to provide a preliminary, baseline estimate of the level of task proficiency that a returning IRR member should be able to exhibit on the fleet job. Thus, this information provided an interim set of goals that a retraining or skill maintenance training program should attempt to achieve. It was planned to obtain a more reliable estimate of task performance/task level proficiency by surveying active duty personnel.

The second purpose was to obtain an initial estimate of the extent to which skill loss might be a problem; specifically, how skill deterioration in IRR members could be expected to affect ability to perform job tasks. It was also planned to compare these SME estimates to data collected from the IRR. However, the IRR data would be considered more reliable because of the larger number of respondents involved. Because of the basic source materials used--principally the PARs--and based on SME opinions, it was further tacitly assumed that the job tasks selected did, in fact, represent the job that IRR members performed while on active duty. This assumption is especially tenable for those separated for 3 years or less. Support for this assumption was also shown by analyses later conducted on IRR and active duty data (see section IV).

Response Options

As mentioned previously, it was desired that the response options used on the questionnaires have meaning to present and former service personnel, be easy to understand, and permit ready selection from among alternatives. The options selected were known to meet these criteria based on the results of previous survey work conducted by the NAVTRASYSCEN (Hall, Denton, & Zajkowski, 1978). In addition to meeting the above criteria, the response options had to permit differentiation among individuals in terms of the level of skill they could apply/demonstrate on job tasks of a rating. In addition to the work cited above, SME opinions also supported that the options presented could adequately discriminate skill levels.

The proficiency response options used on questionnaires were similar to those used by the SMEs. However, the number of options were reduced from five to four. Also, amplifying information was added to better explain a particular choice. A fifth option, "Have never performed the task," was also added. This would provide a basis for comparing job tasks performed by IRR personnel with those performed by active duty personnel. This comparison was desired to determine if the active duty job currently is, in terms of requirements to perform particular tasks, the same job that IRR members previously performed.

Figures 1 and 2 are copies of questionnaires used with HM IRR and active duty samples, respectively. Questionnaires used with the other 15 ratings were identical in format. Job tasks assessed did, of course, differ by rating (see the annexes to appendix D of this report).

Background Questions

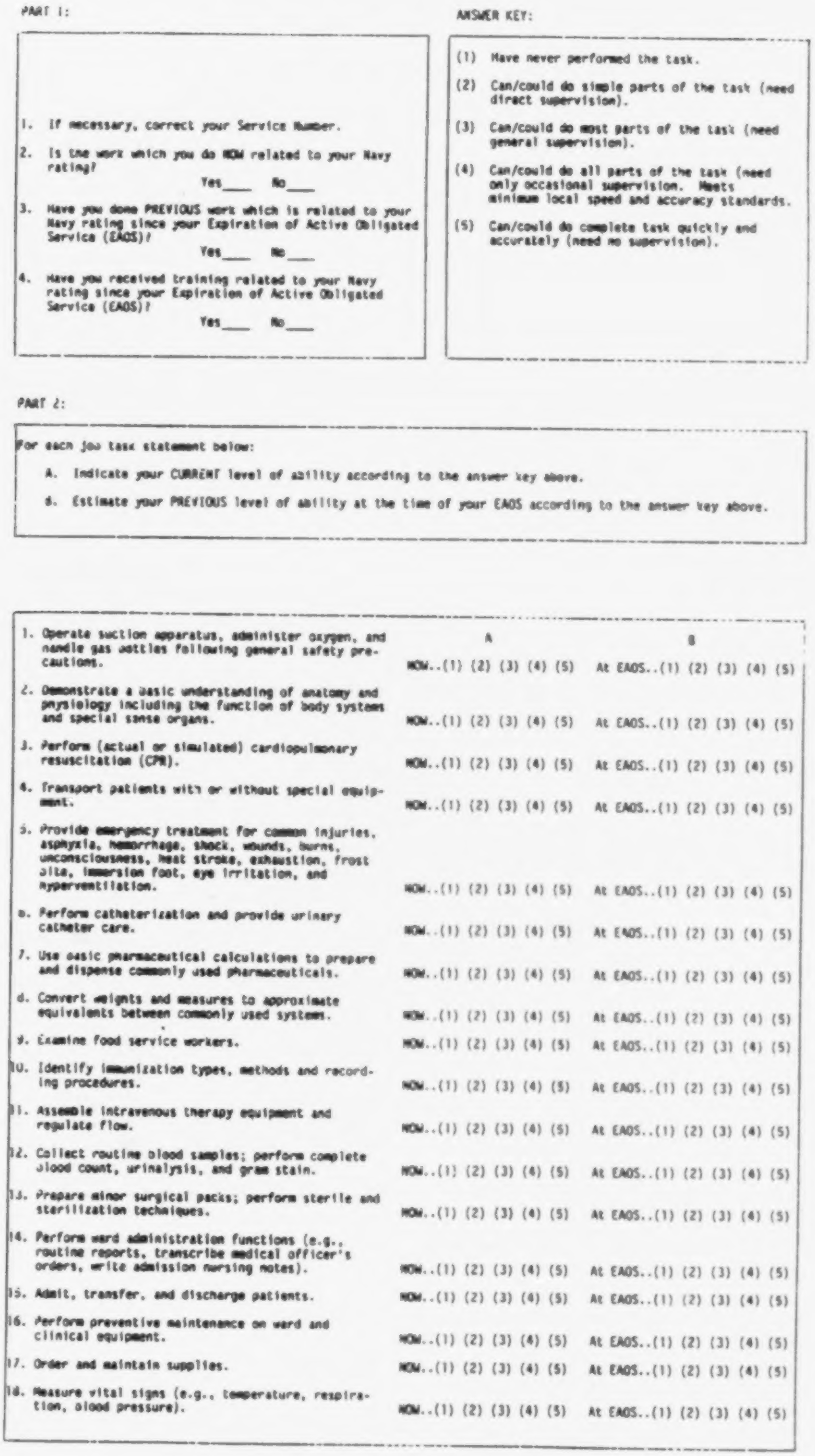
Questions designed to obtain information about experience or training related to an individual's Navy job was also contained on each questionnaire. For the IRR group, information solicited concerned knowledge or experience gained after separation from active duty. It was hypothesized that individuals who had Navy job-related training or experience after EAOS, or who now worked in civilian jobs related to their former Navy jobs, would show less skill loss than those not similarly employed. The questionnaire for surveying active duty personnel asked if respondents were assigned sea or shore duty, and whether they currently worked in rating.

STUDY SAMPLES

Personnel samples employed in the study are described below.

IRR Samples

Coordination with the Naval Reserve Personnel Center (NAVRESPERSCEN) (Code 70) at New Orleans, LA, was accomplished to obtain information about the IRR population. Subsequently, data files were obtained, via NAVRESPERSCEN, from the Naval Military Personnel Command (NAVMILPERSCOM). These listed all IRR personnel in each of the 16 ratings. Information obtained included names, service numbers, and mailing addresses. IRR



PART 1:

1. If necessary, correct your Service Number.
2. Is the work which you do NOW related to your Navy rating?
   Yes___ No___
3. Have you done PREVIOUS work which is related to your Navy rating since your Expiration of Active Obligated Service (EAOS)?
   Yes___ No___
4. Have you received training related to your Navy rating since your Expiration of Active Obligated Service (EAOS)?
   Yes___ No___

ANSWER KEY:

(1)	Have never performed the task.
(2)	Can/could do simple parts of the task (need direct supervision).
(3)	Can/could do most parts of the task (need general supervision).
(4)	Can/could do all parts of the task (need only occasional supervision. Meets minimum local speed and accuracy standards.
(5)	Can/could do complete task quickly and accurately (need no supervision).

PART 2:

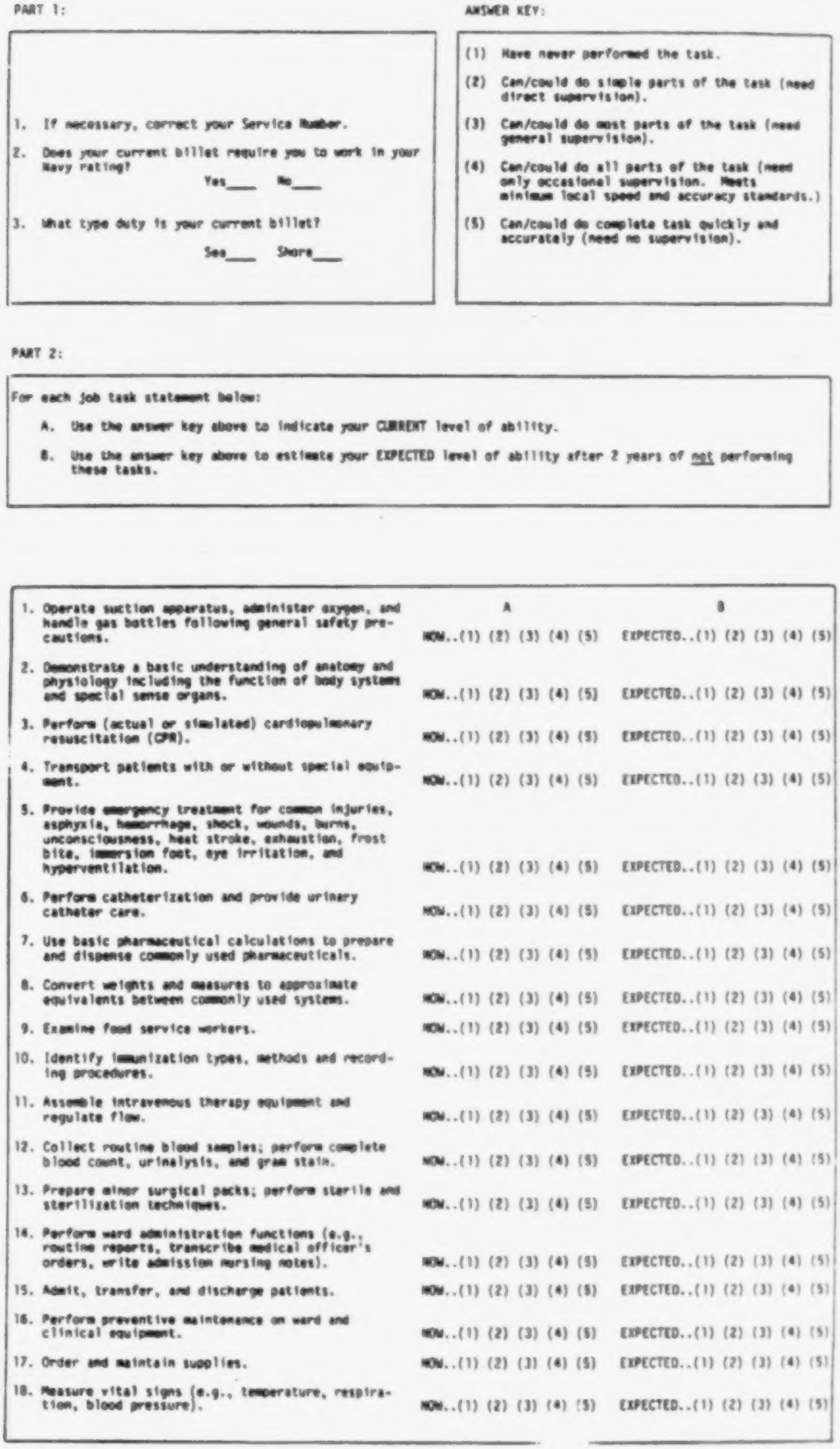
For each job task statement below:

A. Indicate your CURRENT level of ability according to the answer key above.

B. Estimate your PREVIOUS level of ability at the time of your EAOS according to the answer key above.

	A	B
1. Operate suction apparatus, administer oxygen, and handle gas bottles following general safety precautions.	NOW..(1) (2) (3) (4) (5)	At EAOS..(1) (2) (3) (4) (5)
2. Demonstrate a basic understanding of anatomy and physiology including the function of body systems and special sense organs.	NOW..(1) (2) (3) (4) (5)	At EAOS..(1) (2) (3) (4) (5)
3. Perform (actual or simulated) cardiopulmonary resuscitation (CPR).	NOW..(1) (2) (3) (4) (5)	At EAOS..(1) (2) (3) (4) (5)
4. Transport patients with or without special equipment.	NOW..(1) (2) (3) (4) (5)	At EAOS..(1) (2) (3) (4) (5)
5. Provide emergency treatment for common injuries, asphyxia, hemorrhage, shock, wounds, burns, unconsciousness, heat stroke, exhaustion, frost bite, immersion foot, eye irritation, and hyperventilation.	NOW..(1) (2) (3) (4) (5)	At EAOS..(1) (2) (3) (4) (5)
6. Perform catheterization and provide urinary catheter care.	NOW..(1) (2) (3) (4) (5)	At EAOS..(1) (2) (3) (4) (5)
7. Use basic pharmaceutical calculations to prepare and dispense commonly used pharmaceuticals.	NOW..(1) (2) (3) (4) (5)	At EAOS..(1) (2) (3) (4) (5)
8. Convert weights and measures to approximate equivalents between commonly used systems.	NOW..(1) (2) (3) (4) (5)	At EAOS..(1) (2) (3) (4) (5)
9. Examine food service workers.	NOW..(1) (2) (3) (4) (5)	At EAOS..(1) (2) (3) (4) (5)
10. Identify immunization types, methods and recording procedures.	NOW..(1) (2) (3) (4) (5)	At EAOS..(1) (2) (3) (4) (5)
11. Assemble intravenous therapy equipment and regulate flow.	NOW..(1) (2) (3) (4) (5)	At EAOS..(1) (2) (3) (4) (5)
12. Collect routine blood samples; perform complete blood count, urinalysis, and gram stain.	NOW..(1) (2) (3) (4) (5)	At EAOS..(1) (2) (3) (4) (5)
13. Prepare minor surgical packs; perform sterile and sterilization techniques.	NOW..(1) (2) (3) (4) (5)	At EAOS..(1) (2) (3) (4) (5)
14. Perform ward administration functions (e.g., routine reports, transcribe medical officer's orders, write admission nursing notes).	NOW..(1) (2) (3) (4) (5)	At EAOS..(1) (2) (3) (4) (5)
15. Admit, transfer, and discharge patients.	NOW..(1) (2) (3) (4) (5)	At EAOS..(1) (2) (3) (4) (5)
16. Perform preventive maintenance on ward and clinical equipment.	NOW..(1) (2) (3) (4) (5)	At EAOS..(1) (2) (3) (4) (5)
17. Order and maintain supplies.	NOW..(1) (2) (3) (4) (5)	At EAOS..(1) (2) (3) (4) (5)
18. Measure vital signs (e.g., temperature, respiration, blood pressure).	NOW..(1) (2) (3) (4) (5)	At EAOS..(1) (2) (3) (4) (5)

Figure 1. Sample HM IRR questionnaire.



PART 1:

1. If necessary, correct your Service Number.
2. Does your current billet require you to work in your Navy rating?
   Yes___ No___
3. What type duty is your current billet?
   Sea___ Shore___

ANSWER KEY:

(1) Have never performed the task.
(2) Can/could do simple parts of the task (need direct supervision).
(3) Can/could do most parts of the task (need general supervision).
(4) Can/could do all parts of the task (need only occasional supervision. Meets minimum local speed and accuracy standards.)
(5) Can/could do complete task quickly and accurately (need no supervision).

PART 2:

For each job task statement below:

A. Use the answer key above to indicate your CURRENT level of ability.
B. Use the answer key above to estimate your EXPECTED level of ability after 2 years of not performing these tasks.

	A	B
1. Operate suction apparatus, administer oxygen, and handle gas bottles following general safety precautions.	NOW..(1) (2) (3) (4) (5)	EXPECTED..(1) (2) (3) (4) (5)
2. Demonstrate a basic understanding of anatomy and physiology including the function of body systems and special sense organs.	NOW..(1) (2) (3) (4) (5)	EXPECTED..(1) (2) (3) (4) (5)
3. Perform (actual or simulated) cardiopulmonary resuscitation (CPR).	NOW..(1) (2) (3) (4) (5)	EXPECTED..(1) (2) (3) (4) (5)
4. Transport patients with or without special equipment.	NOW..(1) (2) (3) (4) (5)	EXPECTED..(1) (2) (3) (4) (5)
5. Provide emergency treatment for common injuries, asphyxia, hemorrhage, shock, wounds, burns, unconsciousness, heat stroke, exhaustion, frost bite, immersion foot, eye irritation, and hyperventilation.	NOW..(1) (2) (3) (4) (5)	EXPECTED..(1) (2) (3) (4) (5)
6. Perform catheterization and provide urinary catheter care.	NOW..(1) (2) (3) (4) (5)	EXPECTED..(1) (2) (3) (4) (5)
7. Use basic pharmaceutical calculations to prepare and dispense commonly used pharmaceuticals.	NOW..(1) (2) (3) (4) (5)	EXPECTED..(1) (2) (3) (4) (5)
8. Convert weights and measures to approximate equivalents between commonly used systems.	NOW..(1) (2) (3) (4) (5)	EXPECTED..(1) (2) (3) (4) (5)
9. Examine food service workers.	NOW..(1) (2) (3) (4) (5)	EXPECTED..(1) (2) (3) (4) (5)
10. Identify immunization types, methods and recording procedures.	NOW..(1) (2) (3) (4) (5)	EXPECTED..(1) (2) (3) (4) (5)
11. Assemble intravenous therapy equipment and regulate flow.	NOW..(1) (2) (3) (4) (5)	EXPECTED..(1) (2) (3) (4) (5)
12. Collect routine blood samples; perform complete blood count, urinalysis, and gram stain.	NOW..(1) (2) (3) (4) (5)	EXPECTED..(1) (2) (3) (4) (5)
13. Prepare minor surgical packs; perform sterile and sterilization techniques.	NOW..(1) (2) (3) (4) (5)	EXPECTED..(1) (2) (3) (4) (5)
14. Perform ward administration functions (e.g., routine reports, transcribe medical officer's orders, write admission nursing notes).	NOW..(1) (2) (3) (4) (5)	EXPECTED..(1) (2) (3) (4) (5)
15. Admit, transfer, and discharge patients.	NOW..(1) (2) (3) (4) (5)	EXPECTED..(1) (2) (3) (4) (5)
16. Perform preventive maintenance on ward and clinical equipment.	NOW..(1) (2) (3) (4) (5)	EXPECTED..(1) (2) (3) (4) (5)
17. Order and maintain supplies.	NOW..(1) (2) (3) (4) (5)	EXPECTED..(1) (2) (3) (4) (5)
18. Measure vital signs (e.g., temperature, respiration, blood pressure).	NOW..(1) (2) (3) (4) (5)	EXPECTED..(1) (2) (3) (4) (5)

Figure 2. Sample HM active duty questionnaire.

rosters for the CT ratings were dated 10 December 1984. Listings for the other 10 ratings were dated 25 September 1984.

Table 1 lists, by rating, the numbers of IRR personnel that held each rating and the numbers selected to receive questionnaires. Mailing dates are also shown. The decision was made to survey all members of a rating if there were 500 or fewer members. A low questionnaire return rate was expected and this population sampling strategy would result in the return of as many questionnaires as possible. Unfortunately, deviations from this practice occurred for five ratings (BU, EO, CTA, CTI, CTM) because of errors which misidentified the population sizes. For ratings having more than 500 members, random samples of 500 each were drawn.

Table 1

IRR Questionnaire Mail-out Data

Rating	Total No. of Records	Number Initially Mailed	Percent of Total	Date Mailed	Number Follow-ups Mailed	Date Mailed
HM	1,935	500	26	22 Oct 84	320	29 Jan 85
STG	341	341	100	22 Oct 84	246	29 Jan 85
OS	1,117	500	45	30 Oct 84	365	29 Jan 85
BU	459	350	76	31 Oct 84	236	29 Jan 85
EO	459	370	81	31 Oct 84	256	29 Jan 85
AT	1,025	500	49	21 Nov 84	340	29 Jan 85
EM	1,190	500	42	21 Nov 84	351	29 Jan 85
ET	519	519	100	21 Nov 84	332	29 Jan 85
FTM	219	219	100	31 Dec 84	168	29 Jan 85
GSE	16	16	100	31 Dec 84	11	29 Jan 85
CTA	328	222	68	8 Feb 85	136	8 Apr 85
CTI	484	367	76	8 Feb 85	233	8 Apr 85
CTO	820	500	61	21 Feb 85	336	8 Apr 85
CTR	865	500	58	21 Feb 85	309	8 Apr 85
CTM	170	77	45	22 Feb 85	62	8 Apr 85
CTT	657	499	76	22 Feb 85	342	8 Apr 85
TOTAL	10,604	5,980	56		4,043	

Active Duty Samples

Record data on all E-4s on active duty in each of the 16 ratings were obtained directly from the NAVMILPERSCOM. Random samples of personnel in each rating were selected to receive questionnaires. Sample sizes for each rating were based on the total population size, expected return rate (90 percent), and confidence level desired (95 percent). This sampling strategy is described in Krejcie and Morgan (1970). The sample sizes (number mailed) and population sizes are shown in table 2. Personnel listings were current as of 2 August 1985.

Table 2

Active Duty Questionnaire Mail-out Data

Rating	Total No. of Records	Number Mailed	Percent of Total
AT	2,634	427	16
BU	546	292	53
CTA	191	159	83
CTI	181	155	86
CTM	792	321	41
CTO	515	279	54
CTR	422	271	64
CTT	364	271	74
EM	4,692	449	10
EO	443	271	61
ET	6,893	455	7
FTM	1,308	378	29
GSE	338	222	66
HM	6,022	456	8
OS	2,668	427	16
STG	1,531	400	26
TOTAL	29,540	5,233	18

QUESTIONNAIRE ADMINISTRATION

Reserve Group

Mailing information for the IRR group is shown in table 1. All initial mailings were made under a CNO (OP-11) cover letter. Because of anticipated low return rates, follow-up mailings were planned and subsequently accomplished as shown in table 1. Duplicate questionnaires were mailed under a cover letter signed by the Commanding Officer, Naval Training Systems Center. Copies of the IRR questionnaire transmittal letters are provided in appendix C.

Active Duty Group

Coordination was effected with the Commander in Chief, U.S. Pacific Fleet; Commander in Chief, U.S. Atlantic Fleet; and the Commander, Naval Security Group; to obtain authorization to survey active duty personnel. Appropriate coordination within CNO (OP-01) for approval of the survey was also accomplished and a Report Control Symbol (RCS) was assigned to the questionnaires. All active duty questionnaires were mailed on 18 September 1985. These were mailed to 5,233 individuals assigned to approximately 1,200 Naval activities, as identified by distinct Unit Identification Codes (UIC). All questionnaires to a given UIC were mailed in a single package addressed to the activity/unit commanding officer/officer in charge under a CNO (OP-01) cover letter. The cover letter explained the purpose of the survey, requested support for a high return rate, and reported the RCS assigned to the survey. A separate CNO cover letter soliciting cooperation was attached to each respondent's questionnaire. No follow-up mailing was planned since a fairly high return rate was expected from the active duty personnel. Copies of active duty questionnaire transmittal letters are contained in appendix C.

DATA ANALYSIS

Questionnaire returns were accepted until 28 February 1985 from the IRRs in the 10 non-CT ratings and until 24 May 1985 from the CT IRRs. Questionnaires were accepted from active duty personnel until 31 December 1985.

Returned questionnaires were scanned to determine their usability for the project. Those usable were sorted into the 16 rating categories separately for the IRR and active duty groups. Data were entered into computer files. Questionnaires returned by the Postal Service and those not usable for other reasons were maintained separately.

Statistical treatment of the data consisted principally of reducing them to summary measures (i.e., means) and determining relationships among data. Analyses concerned with determining relationships between IRR and active duty data, and those concerned with assessing the need for any type of training for a rating used means computed over all responses (i.e., 1, 2, 3, 4, and 5) possible from an answer key (see figure 1 or 2). Analyses concerned directly with assessing skill deterioration used means computed from choices of only 2, 3, 4, or 5. These responses place proficiency and, consequently, deterioration along a continuum.

The data were organized, tracked, and statistically analyzed using a WANG VS100 minicomputer. To prepare for the survey of the IRRs, a tape extract of the Enlisted Master File (EMF) for the 16 ratings was obtained through NAVRESPERSCEN. This tape was used to create the data base for the Reserve survey. A separate data file was created for each rating to contain demographics as well as data from the returned questionnaires. Only those records were selected that had a Branch and Class of Service (BRCL) code of "32" indicating U.S. Naval Reserve (Ready).

In the cases where a sample was generated, those records with a Pretrained Individual Manpower Management System (PIMMS) indicator code of "4" were selected first. Since these reservists are under positive management by the NAVRESPERSCEN, it was hoped that they would produce fewer bad addresses and a higher response rate. The computer then generated a random sample from the remaining records to complete each file. (See table 1 for the number of questionnaires mailed.)

To establish a baseline for job competency, a tape extract, containing required demographic and service data on all active duty E-4 personnel in the 16 critical ratings, was obtained from the NAVMILPERSCOM. A data base was established for the active duty survey, similar to that of the IRR survey. Table 2 identifies the number of questionnaires mailed for the active duty survey.

After the questionnaire responses were entered into the computer, an on-line software package--the SCSS Conversational System--written by SPSS, Incorporated, was used to perform the required statistical functions. Univariate analyses were run on each file to obtain descriptive statistics and frequency distributions. Means and standard deviations were computed for each task listed on a rating questionnaire.

For IRRs, task means were computed both for the present level of skill (NOW) and for the EAOS levels. Skill degradation was derived by subtracting the mean value reported for each task at EAOS from the mean value reported for that task at the present time (NOW). The IRR data were further reduced into two subgroups to compare proficiency/deterioration differences between those who were not presently working in a job related to their Navy rating, and those who were.

For the active duty group, task means were computed for current proficiency and "expected" proficiency for those currently assigned duty in their rating, and for those who were not currently working in their rating. Task mean proficiency values for the active duty E-4s (current proficiency, working in the rating) were used as a criterion for assessing IRR needs for premobilization training.

The Zenith 120, using the Microstat software package, was employed for several other statistical procedures. Rank order correlations were run between EAOS responses for IRR members and NOW (current) responses of active duty members of each rating. Pearson Product Moment correlations comparing the Reserve EAOS responses with the active duty NOW responses were also obtained for each rating. Also, t tests were run on data from subgroups to assess response equivalence at EAOS and at the current time.

SECTION III

RESULTS

This section presents summaries of data pertinent to the assessment of skill deterioration and determination of IRR training needs. The summaries concern all 16 ratings studied. Results applicable to the individual ratings are presented in the 16 annexes to appendix D of this report.

QUESTIONNAIRE RETURN STATISTICS

Table 3 shows questionnaire return statistics for all 16 ratings assessed. The table presents, by rating, first, the number of questionnaires mailed and the number and percent of nonvalid returns (nonvalid principally because of data base errors). The nonvalid category was composed mostly of questionnaires that could not be delivered by the Postal Service because of incorrect mailing addresses. The number of questionnaires that were, presumably, delivered to addressees is shown next. Information concerning usable returns is given in the final column. Percent usable returns was computed over the "number delivered" base (e.g., for CTTs, 98 usable returns came from the 361 delivered for a usable return rate of 27.1 percent).

Table 3

Questionnaire Return Statistics: IRR

Rating	Number Mailed	Nonvalid Returns		Number Delivered	Usable Returns	
		No.	Percent		No.	Percent
AT	500	46	9.2	454	212	46.7
BU	350	54	15.4	296	126	42.6
CTA	222	71	32.0	151	50	33.1
CTI	367	118	32.2	249	77	30.9
CTM	77	31	40.3	46	11	23.9
CTO	500	127	25.4	373	114	30.6
CTR	500	153	30.6	347	91	26.2
CTT	499	138	27.7	361	98	27.1
EM	500	35	7.0	465	198	42.6
EO	370	43	11.6	327	147	45.0
ET	519	52	10.0	467	235	50.3
FTM	219	17	7.8	202	73	36.1
GSE	16	1	6.3	15	10	66.7
HM	500	54	10.8	446	214	48.0
OS	500	31	6.2	469	185	39.4
STG	341	36	10.6	305	124	40.7
TOTALS	5,980	1,007	16.8	4,973	1,965	39.5

Questionnaire return statistics for the active duty samples are shown in table 4. Since there were virtually no unusable returns, the percent usable was calculated simply by number returned/number mailed.

Table 4

Questionnaire Return Statistics: Active Duty

Rating	Number Mailed	Number Returned	Percent Usable
AT	427	257	60.2
BU	292	163	55.8
CTA	159	117	73.6
CTI	155	79	51.0
CTM	321	216	67.2
CTO	279	184	66.0
CTR	271	177	65.3
CTT	271	158	58.3
EM	449	295	65.7
EO	271	143	52.8
ET	455	316	69.5
FTM	378	260	68.8
GSE	222	145	65.3
HM	456	285	62.5
OS	427	290	67.9
STG	400	268	67.0
TOTALS	5,233	3,353	64.1

BACKGROUND QUESTIONS

Table 5 shows the number and percent of IRRs who reported that they now work in civilian jobs that are related to their Navy ratings. Related civilian employment ranged from a low of 7 percent for the OSs to a high of 70 percent for the BUs. Other analyses, summarized later in this section, were performed to determine the effects of civilian related employment on skill deterioration and IRR training needs. Answers to the other two background questions on the IRR questionnaire (see figure 1, part I, items 3 and 4) concerning previous rating-related work and training are not reported. It was determined that these answers might be somewhat redundant and could not be unambiguously interpreted.

Information concerning the current assignments of active duty personnel is provided in table 6. These data reflect the answers to questions 2 and 3 of part I of the active duty questionnaires, a sample of which is shown in figure 2. These data are provided for information only. No secondary analyses were performed to determine the effects of these variables on reported proficiency.

Table 5

Reservists Working in Civilian Jobs Related to Their Navy Ratings

Rating	Working in Related Job		Number Answering
	Number	Percent	
AT	110	52.9	208
BU	85	70.2	121
CTA	11	22.4	49
CTI	8	10.5	76
CTM	7	63.6	11
CTO	24	21.4	112
CTR	10	11.0	91
CTT	27	28.7	94
EM	104	55.0	189
EO	89	61.8	144
ET	138	60.5	228
FTM	38	55.1	69
GSE	3	30.0	10
HM	107	50.7	211
OS	12	6.6	181
STG	22	18.2	121
TOTALS	795	41.5	1,915

TIME IN IRR

As noted previously, the IRRs of most interest to the study were those separated from active duty for less than 3 years. Table 7 shows the numbers (and percent) of IRRs in each rating who fell into this category. Over all ratings studied, less than half of the IRRs had EAOS dates of less than 3 years. Over the six CT ratings, only 12.2 percent fell into the under-3-year category. Note that table 7 entries apply only to the IRRs who returned questionnaires. No attempt was made to analyze the total data file that was available for the 16 ratings.

An incidental finding of the study also concerned the IRR file data. Date of "Last Release from Active Duty" (LRAD), which equates to EAOS for those completing their Military Service Obligation (MSO), was not contained on the records for a number of IRR personnel. Consequently, time between separation from active service and the questionnaire mailing date could not be determined. The number and percent of records in each rating sample for which this information was not available is shown in table 8. Over all the ratings, LRAD data were insufficient for 438 of 5,980 IRRs (7 percent). The two construction ratings (BU, EO) accounted for 43 percent of the insufficient data.

Table 6

Assignments of Active Duty Personnel

Rating	Assigned Sea Duty			Working in Rating		
	Number	Percent	Number Answering	Number	Percent	Number Answering
AT	98	38.9	252	233	91.7	254
BU	54	34.4	157	144	91.1	158
CTA	106	93.8	113	99	86.8	114
CTI	60	77.9	77	73	93.5	78
CTM	195	92.0	212	202	95.7	211
CTO	149	82.3	181	163	90.0	181
CTR	159	91.9	173	159	90.8	175
CTT	138	88.5	156	147	94.8	155
EM	33	11.3	292	274	93.1	294
EO	48	34.3	140	120	85.7	140
ET	87	27.8	313	290	92.6	313
FTM	9	3.5	256	247	96.8	255
GSE	8	55.9	143	128	90.7	141
HM	195	69.1	282	246	88.4	278
OS	14	4.9	286	266	93.6	284
STG	4	1.5	264	251	95.0	264
TOTALS	1,357	41.2	3,297	3,055	92.7	3,295

TASK PERFORMANCE DATA

Data summary tables giving detailed, complete task performance information for IRRs and active duty personnel are presented in the 16 annexes to appendix D. Only those analyses conducted to assess equivalency of data from the two sources are considered in this present section.

Equivalency of data obtained from IRR and active duty personnel in each rating was assessed through correlations. Rank order correlations were used to compare the frequency of selection of "1" choices by IRR personnel and active duty personnel. A "1" choice indicated that a respondent had never performed a given job task. Tasks were ranked from 1 to "n" on the basis of highest number (percentage) of "1" choices to lowest. A rank order correlation (see Siegel, 1956) was computed, for each rating, between the data for IRR EAOS answers and active duty NOW (current) responses. The resulting rank order correlations are shown in table 9. These correlations were significant for 15 of the 16 ratings. Thus, the percentage of Reserve personnel who had not performed specific tasks during their earlier active duty tends, strongly for most ratings, to be the same as it is now for active duty personnel. Thus, the structure of the rating jobs, considering the need to perform specific tasks, is relatively unchanged since the IRRs left active duty.

Table 7

IRR Member Time Since Separation from Active Duty

	Less Than 3 Years		More Than 3 Years		
Rating	Number	Percent	Number	Percent	Total N
AT	107	58.8	75	41.2	182
BU	31	36.0	55	64.0	86
CTA	6	13.0	40	87.0	46
CTI	10	14.3	60	85.7	70
CTM	1	9.1	10	90.9	11
CTO	7	6.7	98	93.3	105
CTR	14	17.5	66	82.5	80
CTT	10	12.3	71	87.7	81
EM	115	73.7	41	26.3	156
EO	44	36.1	78	63.9	122
ET	80	36.4	140	63.6	220
FTM	38	58.5	27	41.5	65
GSE	9	90.0	1	10.0	10
HM	135	64.9	73	35.1	208
OS	125	74.0	44	26.0	169
STG	81	73.3	31	27.7	112
TOTALS	813	47.2	910	52.8	1,723

To determine the relationships between the proficiency exhibited on the job tasks by IRRs during their earlier active service and the proficiency currently exhibited by E-4s, Pearson Product Moment Correlations (see Guilford & Fruchter, 1973) were computed for each rating between job task means for IRR EAOS and active duty (NOW) values. These correlations are also shown in table 9. Again, the correlations are generally significant and also indicate a high degree of correspondence. The IRR members when on active duty performed job tasks at competency levels equivalent to those of current job incumbents.

SKILL DETERIORATION

Detailed IRR skill deterioration information for each task of each rating is given in the annexes to appendix D. These are provided as mean values computed for each job task separately. Summarized skill deterioration information is provided in table 10. The table displays grand means, computed over all tasks and all respondents in a rating, for proficiency at EAOS and NOW. The numbers of cases on which the means are based are also shown. These single values reflect overall changes in performance reported by IRRs to have occurred between EAOS and the present time (i.e., when they answered the questionnaires). The table shows that decreases in skill levels occurred across the job tasks for 14 of the 16 ratings assessed during the time personnel were assigned to the IRR. However, BUs and EOs reported an overall average gain in proficiency.

Table 8

Insufficient LRAD Data in Rating Samples

Rating	Sample Size	Insufficient LRAD Number	Percent
AT	500	30	6
BU	350	86	25
CTA	222	31	14
CTI	367	15	4
CTM	77	11	14
CTO	500	10	2
CTR	500	22	4
CTT	499	14	3
EM	500	9	2
EO	370	102	28
ET	519	48	9
FTM	219	7	3
GSE	16	1	6
HM	500	22	4
OS	500	12	2
STG	341	18	5

Table 9

Rank Order Correlations (Rho) and Pearson Correlations (r) Between IRR EAOS and Active Duty Task Performance Data

	Frequency of Performance		Proficiency of Performance	
Rating	Rho	Significant	r	Significant
AT	.78	Yes	.91	Yes
BU	.96	Yes	.96	Yes
CTA	.90	Yes	.57	No
CTI	.84	Yes	.82	Yes
CTM	.54	Yes	.43	No
CTO	.85	Yes	.96	Yes
CTR	.72	Yes	.75	Yes
CTT	.67	Yes	.80	Yes
EM	.94	Yes	.96	Yes
EO	.94	Yes	.97	Yes
ET	.83	Yes	.65	Yes
FTM	.89	Yes	.91	Yes
GSE	.15	No	.12	No
HM	.92	Yes	.93	Yes
OS	.56	Yes	.63	Yes
STG	.81	Yes	.91	Yes

Table 10

Average IRR Proficiencies at EAOS and NOW

Rating	EAOS Proficiency	n	NOW Proficiency	n
AT	4.259	177	3.936	182
BU	3.494	82	3.757	87
CTA	4.374	47	3.618	46
CTI	3.893	70	3.002	70
CTM	4.210	11	3.979	11
CTO	4.236	102	3.226	105
CTR	3.450	80	2.691	80
CTT	3.640	80	2.883	81
EM	4.019	156	3.779	156
EO	3.141	108	3.400	122
ET	4.167	219	4.030	220
FTM	4.073	64	3.683	65
GSE	4.429	10	3.986	10
HM	4.107	207	3.795	207
OS	4.500	169	3.970	169
STG	4.279	114	3.623	112

Effects of Related Work Experience

Several analyses were conducted to determine if skill deterioration was related to current civilian occupation. Table 5 above presented information concerning the numbers of IRRs who reported that they currently worked in a civilian job related to their Navy ratings. Table 11 presents summary information concerning the effects of this related civilian employment on skill deterioration.

The table shows how task mean proficiency values changed between EAOS and NOW for two IRR subgroups--those now working in a job related to their Navy rating (W) and those not working in a rating-related job (N). The table shows, for example, that between EAOS and NOW, the "W" ATs reported proficiency gains (i.e., higher mean values) on 7 of the 18 job tasks assessed (39 percent), proficiency losses on 10 tasks (56 percent), and no change on 1 task (6 percent). The "N" ATs lost proficiency (i.e., had lower mean values) on all 18 tasks (100 percent). Other table entries should be read similarly. The table shows, overall, that IRRs working in rating-related jobs were more likely to gain proficiency on more job tasks than IRRs who did not work in rating-related jobs.

Table 12 compares the two IRR subgroups on mean values assigned to job tasks for NOW proficiency. The table shows the number and percent of tasks for each rating for which IRRs in the "W" subgroups reported lower current (NOW) task mean values than the "N" subgroups. The table shows, for example, that ATs working in rating-related civilian jobs reported a lower mean value than the "N" subgroup for only 1 of the 18 job tasks. By extrapolation, the "N" subgroup had lower mean values (less proficiency) on the other 17 tasks. Alternately, the AT "W" subgroup reported higher absolute mean values for 17 of the 18 job tasks. Less current proficiency was associated with the "W" subgroup over the majority of job tasks for a rating for only three of the ratings (GSE, OS, and STG). Note also that these three ratings had relatively small percentages of IRR members working in rating-related civilian jobs (see table 5).

Table 11

Proficiency Changes Between EAOS and NOW for IRRs Working/Not Working in a Rating-Related Field

		Working in Field (W)			Not Working in Field (N)		
Rating	No. of Tasks	Percent of Tasks Gained	Percent of Tasks Lost	Percent No Change*	Percent of Tasks Gained	Percent of Tasks Lost	Percent No Change
AT	18	39	56	6	-	100	-
BU	30	90	7	3	37	63	-
CTA	9	22	67	11	-	100	-
CTI	16	-	100	-	-	100	-
CTM	13	31	54	15	-	92	8
CTO	13	-	100	-	-	100	-
CTR	11	9	82	9	-	100	-
CTT	23	9	91	-	-	100	-
EM	23	48	52	-	-	100	-
EO	27	100	-	-	26	67	7
ET	20	50	50	-	-	95	5
FTM	23	26	74	-	-	100	-
GSE	21	-	81	19	5	67	29
HM	18	22	72	6	-	100	-
OS	20	-	100	-	-	100	-
STG	16	-	100	-	-	100	-

*Percentages do not add to 100 because of rounding.

The significance of the differences between task mean values for NOW proficiency for the two subgroups was assessed for all ratings using t tests for independent means (see Guilford & Fruchter, 1973). The results are shown in table 13. Differences between the subgroups on current proficiency were significant for 14 of the 16 ratings. Higher mean values were associated with the "W" subgroups of these ratings.

Table 12

Tasks on Which IRRs Working in a Rating-Related Job Had Lower Task Means Than IRRs Not Working in a Rating-Related Job

Rating	Total No. of Tasks	No. of Lower Task Means	Percent
AT	18	1	6
BU	30	5	17
CTA	9	0	-
CTI	16	7	44
CTM	13	0	-
CTO	13	1	8
CTR	11	2	18
CTT	23	0	-
EM	23	1	4
EO	27	2	7
ET	20	0	-
FTM	23	1	4
GSE	21	16	76
HM	18	0	-
OS	20	13	65
STG	16	10	63

Since the current proficiency differences could possibly be due to initial differences between subgroup proficiency at EAOS, a second set of *t* tests was run on the EAOS task mean values. These results are also shown in table 13. Differences at EAOS were not significant for 13 of the 16 ratings. Thus, for these ratings, differences in current proficiency could not reasonably be attributed to initial differences between the two subgroups. The results of these analyses indicated that (in 13 cases) IRRs who after EAOS worked in jobs related to their Navy rating lost less skill (conversely, had higher proficiency) than IRRs who did not.

Effects of Time

A subsidiary interest of this study concerned the effects of time on performance levels. Answers were desired to questions such as, (1) "At what point in time does skill deterioration level off?" and (2) "When should retraining begin?" Respondents in each rating were sorted into time groups of 6 months each up to 3 years since EAOS. All those with EAOS dates 3 years or longer before the questionnaires were mailed were lumped into a single category. Means were computed for each time interval group for each rating. Also, a grand mean was computed over all ratings for the separate time intervals. The resulting values are shown in table 14. The numbers of cases on which means are based are shown in parentheses. The data revealed no trends in performance levels over time. The values remained relatively constant over all time interval groups within ratings and for the grand means across ratings.

Table 13

Results of t Tests Comparing Differences Between Task Means at EAOS and NOW for Two Subgroups of IRRs

Rating	EAOS		NOW	
	t	Significant	t	Significant
AT	.34	No	3.66	Yes
BU	1.16	No	2.97	Yes
CTA	1.66	No	5.98	Yes
CTI	3.71	Yes	2.74	Yes
CTM	-.98	No	4.19	Yes
CTO	.22	No	1.92	Yes
CTR	1.20	No	3.11	Yes
CTT	-.85	No	5.71	Yes
FM	.50	No	2.50	Yes
EO	.50	No	3.66	Yes
ET	1.66	No	4.07	Yes
FTM	1.30	No	4.18	Yes
GSE	2.86	Yes	-1.66	No
HM	.45	No	3.04	Yes
OS	4.32	Yes	1.96	Yes
STG	.95	No	.27	No

TRAINING NEEDS

Data presented in the immediately preceding subsection pertained to skill deterioration during IRR membership. An additional line of analysis was needed to assess the implications of skill deterioration for training/retraining of IRR personnel prior to mobilization. These analyses compared IRR current proficiency (i.e., task mean values) to proficiency reported by active duty E-4 personnel. These comparisons, made on a task-by-task basis for each rating, are fully reported in the annexes to appendix D. Table 15 summarizes the results.

Table 15 shows overall mean proficiency values for active duty E-4 personnel currently assigned duty in a given rating. The values are means of the individual mean proficiency values assigned to all tasks within a given rating. It also shows overall means for the two IRR subgroups comprising a rating. Interpretation of the data shown is deferred to the next section of this report. Note, however, that all three sets of means are relatively close in values. Particularly close are the values assigned by active duty personnel and the IRR "W" subgroups. These summary measures indicate there is little need for IRR retraining, especially for the "W" subgroups.

Table 14

Average Performance Values by Rating at Different Time Intervals Since Separation From Active Duty

	Time Interval (in months)													
Rating	0-5		6-11		12-17		18-23		24-35		36+		Average	
AT	3.79	(28)	3.82	(20)	3.85	(39)	4.09	(6)	4.21	(14)	4.00	(75)	3.94	(182)
BU	3.45	(23)	3.80	(4)	4.30	(2)	3.70	(1)	3.83	(1)	3.86	(55)	3.76	(86)
CTA	3.22	(3)	-	-	3.22	(1)	-	-	4.22	(2)	3.63	(40)	3.62	(46)
CTI	3.23	(6)	-	-	4.63	(1)	-	-	3.71	(3)	2.92	(60)	3.00	(70)
CTM	-	-	-	-	-	-	-	-	4.69	(1)	3.91	(10)	3.98	(11)
CTO	3.72	(3)	-	-	-	-	-	-	3.47	(4)	3.20	(98)	3.23	(105)
CTR	1.97	(7)	-	-	-	-	-	-	3.12	(7)	2.71	(66)	2.68	(80)
CTT	3.23	(3)	-	-	3.46	(2)	-	-	2.83	(5)	2.86	(71)	2.89	(81)
EM	3.90	(23)	3.72	(24)	3.49	(28)	3.99	(23)	3.58	(17)	3.91	(41)	3.78	(156)
EO	3.21	(28)	3.52	(7)	4.05	(3)	4.15	(1)	3.53	(5)	3.41	(78)	3.40	(122)
ET	3.87	(22)	4.26	(7)	4.31	(17)	3.66	(13)	4.20	(21)	4.02	(140)	4.03	(220)
FTM	4.05	(9)	3.17	(4)	3.66	(7)	4.17	(6)	3.79	(12)	3.49	(27)	3.68	(65)
GSE	2.86	(1)	4.26	(3)	4.67	(1)	3.27	(2)	4.39	(2)	4.29	(1)	3.99	(10)
HM	3.70	(45)	3.48	(16)	3.73	(32)	3.69	(14)	3.76	(28)	3.99	(73)	3.80	(208)
OS	4.16	(32)	4.00	(20)	4.06	(45)	4.28	(16)	3.95	(12)	3.62	(44)	3.97	(169)
STG	3.95	(23)	3.91	(12)	3.42	(14)	3.69	(19)	3.66	(13)	3.31	(31)	3.62	(112)
MEAN	3.69		3.79		3.84		3.90		3.79		3.53		3.65	
TOTAL n		(256)		(117)		(192)		(101)		(147)		(910)		(1723)

Table 15

Overall Performance Ratings for Active Duty Personnel and IRRs Working/Not Working in a Rating-Related Job

		IRR	
Rating	Active Duty	"W"	"N"
AT	4.39	4.36	3.91
BU	3.86	4.13	3.79
CTA	4.34	4.56	3.79
CTI	4.11	3.80	3.33
CTM	4.13	4.38	3.76
CTO	4.30	3.88	3.49
CTR	3.91	4.02	3.36
CTT	3.88	3.89	3.21
EM	4.17	4.32	4.06
EO	4.02	4.18	3.82
ET	4.41	4.45	3.99
FTM	4.37	4.29	3.75
GSE	4.08	3.92	4.21
HM	4.24	4.32	3.98
OS	4.58	4.27	4.07
STG	4.00	3.87	3.83

Reference to the annexes of appendix D is encouraged for examination of the individual analyses conducted for each rating before reaching firm conclusions about retraining. Summary data derived from those individual analyses are, however, given in table 16. The table shows the percentage of tasks for the "W" and "N" IRR subgroups in each rating on which retraining prior to mobilization is indicated by the analyses conducted. Note that these data apply to retraining or refresher training where the objective is to restore lost skills to some specified (minimum) level. They also apply to skill maintenance training in that once skills are restored to the minimum level, training should be given to keep the skills at that level. The data do not, however, apply to skill upgrade training. Skill upgrade training must be considered separately from training needed to offset or overcome the effects of skill deterioration. Skill upgrade training is a matter of providing training on job tasks that an individual could not previously perform. These requirements are discussed in the annexes.

Table 16

Retraining Requirements Indicated for Rating Job Tasks

Rating	Number of Job Tasks	Percent Retraining Indicated IRR "W"	Percent Retraining Indicated IRR "N"
AT	18	0	11
BU	30	0	3
CTA	9	0	0
CTI	16	25	69
CTM	13	0	15
CTO	13	38	62
CTR	11	27	64
CTT	23	9	78
EM	23	0	4
EO	27	0	0
ET	20	0	0
FTM	23	0	30
GSE	21	0	0
HM	18	0	0
OS	20	0	5
STG	16	13	0

SECTION IV

DISCUSSION

This section comments on the data presented in section III and provides brief discussions of the overall results of the study. The principal purpose of the discussions is to summarize knowledge gained about the IRRs in all 16 critical ratings studied. It is cautioned that firm conclusions about skill deterioration and training needed to support mobilization should ultimately be based on data relevant to the individual ratings. Data specific to the individual ratings, and interpretations concerning training needed for IRRs in those ratings, are contained in the 16 annexes to appendix D of this report. These annexes should be consulted before firm decisions concerning the specific actions needed prior to mobilization are made. The comments and discussions presented below concern the IRR data base, skill deterioration, and training of IRRs needed to support mobilization for the 16 ratings studied. Finally, suggestions concerning data validation are provided.

COMMENTS ON DATA BASE

Several apparent data base deficiencies were revealed by the study. These are noted below.

Approximately 17 percent of all questionnaires returned were classified as "nonvalid" (table 3). Almost 30 percent of the questionnaire returns for CTs were nonvalid. For the remaining 10 ratings, only 9.7 percent were nonvalid. The nonvalid category included, most prominently, questionnaires returned by the Postal Service as undeliverable (incorrect addresses). Presumably, mobilization orders would also be undeliverable.

The nonvalid category also included a small number of questionnaires returned with comments such as: "No longer in IRR, returned to active duty, already received final discharge. Retiree recruited from another service, was never on active duty in the Navy." Finally, a very few questionnaires were returned by individuals who refused to provide information and, some, by relatives marked, "Deceased." These factors affect estimates of the size of the available IRR manpower pool.

All information concerning "nonvalid" returns was transmitted to the Naval Reserve Personnel Center on 26 September 1985 for their use in determining a need to validate the IRR data base.

Questionnaires were presumably delivered by the Postal Service to a number of IRRs in the 16 ratings (60.5 percent) from whom (and about whom) no information was received. It is likely that many did not respond because, for reasons such as those cited above, they felt the questionnaire was not applicable. A further group, of unknown size, then would also be unavailable for mobilization. They are not in the viable IRR manpower pool as is currently believed.

Another data base issue that arose concerns the amount of time that respondents have been away from active duty. This information is given in table 7. Only 47 percent were in the IRR for 3 years or less. The small percentages for the CT ratings are especially noticeable. Two issues emerge from time considerations: (1) the need for skill upgrading and (2) availability for recall of IRR members.

Skill upgrade training because of new equipment, procedures, or material may not be required for the less-than-3-years-since-EAOS group. It probably should be considered for the remaining 53 percent, however, despite their beliefs in their continuing ability to perform job tasks at an acceptable level (table 7). SMEs should make this determination based on changes to how the job is now performed.

The second consideration concerns the MSO. At the time this study was initiated, the MSO was 6 years. (The MSO has since been increased to 8 years.) Sixty-one percent of the group had been in the IRR more than 2 years. Unless these reservists continued in the IRR under individual agreements, they were beyond the zone of involuntary recall to active duty. Therefore, the actual size of the available IRR manpower pool may be overestimated. A different type of MSO-related problem was shown for several ratings, most notably the CT ratings. In this case, very few names were listed in the under-2-years-since-EAOS category; the names of individuals who should have been completing their MSO were conspicuously absent.

An incidental finding also concerned the IRR file data. Date of "Last Release from Active Duty," which for first-tour service members indicates "End of Active Obligated Service," was not contained on 7 percent of the IRR personnel records. Without LRAD information, purging the files when the MSO expires could be a problem.

Based on the factors discussed above, complete examination of the IRR data file is recommended. The accuracy of the data and the existence of recall agreements should be verified. Procedures used to maintain the data files (data input, file update) should also be reviewed and corrected as necessary.

SKILL DETERIORATION

Summary information directly pertinent to skill deterioration was presented in table 10. These data showed that deterioration occurred for all ratings except BUs and EOs who, rather than losing proficiency, actually gained some proficiency in the time since EAOS. The task-level data presented in the annexes to appendix D also showed that skill deterioration occurs during IRR membership, and, further, that the amount of this deterioration is related to an IRR's work experience after separation from active service.

Computed over all 16 ratings, approximately 42 percent of IRRs reported that they currently worked in civilian occupations related to their Navy ratings. The actual percentages, of course, vary by rating and probably reflect the availability of civilian employment in particular technical fields. Table 11 shows that for 15 ratings IRRs who work in civilian jobs related to their Navy rating reported less skill deterioration on job tasks than their counterparts who do not work in a related field. Civilian rating-related employment in most cases signficantly affected skill deterioration. Those continuing to work in their fields after EAOS reported less deterioration. Consequently, their needs for retraining were also less.

TRAINING NEEDS

While skill deterioration information is of interest in its own right, the more important concern of this study was with determining the need for training IRR personnel prior to a mobilization recall. Thus, the implications of skill deterioration data must be assessed against the criterion of acceptable, or minimum, level of proficiency. This can be done most directly by comparing the current proficiency levels reported by IRRs against the levels reported by active duty personnel. The task means for the active duty sample can be taken as E-4 criterion performance since they reflect the level of proficiency claimed by the average E-4 now on active duty.

The meaning of specific numerical values reported for task means must be clearly understood before conclusions about skill deterioration or training needs can be derived. Attention is directed to the "answer key" shown on either figure 1 or 2. The answer key shows that a value of "4," for example, suggests that a respondent could perform all parts of the task with only a need for occasional supervision. Following conventional practice, we assume that a "4" is reflected by any values between 3.50 and 4.49. A "3" is interpreted similarly. Thus, skill deterioration may be shown by lower mean values for NOW (i.e., current) versus EAOS proficiency. However, the change from EAOS scores may not be sufficient to move the IRR respondents to a lower proficiency category. Thus, it could be concluded that skill deterioration occurred, but, in this case, the amount was insignificant in terms of signaling a need for retraining. If the respondent had moved to a lower proficiency category, it might be concluded that retraining is needed.

Assessment of the implications for retraining of skill deterioration information can lead to very different conclusions depending on the criterion used to make the assessment. Often, the only information available to a study is the pre- and post-measurements--in our case, proficiency at EAOS and current (NOW) proficiency--that are taken on all appropriate group(s). In many studies, a proper conclusion could be that if significant amounts of deterioration occur, then retraining is needed to restore the individuals to some previous, higher level of proficiency. In the present study, the concern is not with the absolute amounts of deterioration that occurred, nor is it with returning IRRs to their previous proficiency levels. Our direct concern is with the current proficiency of IRRs, and skill deterioration is of interest insofar as it determines current proficiency. The question is not, "What needs to be done to restore IRRs to their former proficiency levels?" The question is, rather, "Is the current proficiency of IRRs sufficient to support mobilization without retraining?" Thus, assessment of the need for training IRR personnel against mobilization should proceed with comparisons between IRR current competencies and the competencies now required on the active duty job.

Table 15 presents grand mean values reported for current proficiency by IRR personnel who are not working in a field related to their rating, for those who are working in a related field, and for active duty personnel working in their rating. Inspection of the data shows that most values are essentially "4"s. Hence, from these data alone, a fair conclusion is that large scale training of IRRs would not be required before mobilization to bring their proficiency to acceptable levels. However, this conclusion is at a general level across the ratings and the findings for individual ratings must also be considered (see appendices D-1 through D-16).

From assessments made at the rating level, we feel that the current level of proficiency of IRRs is probably sufficient to support mobilization for most of the ratings studied. There seems to be no need for extensive retraining or maintenance training for most IRRs prior to a mobilization recall. The average IRR should be able to perform required job tasks at an appropriate level of competency with a modicum of refamiliarization at mobilization. For the most part, this could probably be given by close, corrective supervision while the returnee is performing job tasks. This conclusion is especially relevant to the IRRs who continue to work in a rating-related occupation.

Exceptions to this general conclusion of minimum retraining occur for the CTI, CTO, CTR, CTT, and FTM ratings. Analyses conducted at the individual rating level indicate that formal refresher training should be considered for all IRR CTIs, CTOs, and CTRs. Development of specialized premobilization curricula using data provided by this study to identify training emphases is recommended. Similarly, formal refresher training for CTTs and FTMs who are not currently employed in civilian jobs related to their Navy ratings should be considered. Once these five groups have reacquired "minimum" proficiency, periodic maintenance training should also be considered.

An additional factor to consider in assessing needs for training concerns time since EAOS. Fifty-three percent of the IRRs in the sample were away from active duty for more than 3 years (see table 7). Subject matter experts who review the data provided here may determine that skill upgrade training is required because of technical changes (e.g., new equipment, materials, procedures) in the field. The concern here is with training IRRs for skills they have not previously possessed.

VALIDATION OF DATA

Our analyses indicate that, for the ratings studied, the need for training IRRs against mobilization requirements is not extensive. Required proficiency, defined as the level shown by current E-4 job incumbents (see column 2, table 15, and table 7 in each of the annexes to appendix D) can probably be achieved for most ratings through supervised practice. Instructional modules for training prospective returnees on specific tasks may also be beneficial. Additional information is needed, however, for firm decisions about training to bring prospective IRR returnees to an acceptable level of proficiency or to maintain their skills at a defined level. We recommend that the data provided by this report be evaluated/validated by resource sponsors against a number of other considerations mentioned below.

Data Review

The conclusions generated by the project staff are considered tentative and subject to verification. Generalizations are limited due to the small numbers of questionnaires returned and because of suspected IRR data base inadequacies. Nevertheless, much useful information can be gleaned from the descriptive summaries provided. Most of this information has not previously been available because of the difficulties inherent in conducting skill deterioration research, as well as restrictions on methods that can be used because of practical considerations. Maximum exploitation of the information that is now available is in order. A complete and accurate assessment of the meaning and action implications of the data should be made by individuals who are thoroughly knowledgeable of technical requirements of the different ratings. The NAVTRASYSCEN, if requested, could assist SMEs in this effort. Areas to be considered in the review/validation process are discussed next.

Review Areas

For our study, schoolhouse SMEs identified the job tasks they thought would be appropriate for IRR members returning to active duty to perform. Other SMEs may not agree on the list. Resource sponsors should determine if these are indeed the job tasks that an IRR returnee (at mobilization) should be able to perform. A companion decision is required concerning the acceptability of the reported level of competency. Since active duty personnel reported that they, on the average, now perform at these levels, these data reflect E-4 criterion performance. Resource sponsors should consider whether less proficiency would be acceptable. If so, attendant training requirements and concomittant resource requirements would be lessened. In this regard, a key issue to be resolved is the meaning to be placed on the Defense Guidance notion of "minimum" proficiency to support mobilization. The term requires a specific definition so that training goals can be precisely defined.

On judging the need for training, task criticality, in terms of personnel or equipment safety as it interacts with recent changes to material, procedures, or equipment, must also be considered. An additional decision factor concerns plans for utilization of IRR personnel upon mobilization recall. If these individuals (CTs for example) will serve as casualty replacements, then a fairly high level of proficiency at recall is desirable. Training, as determined by the study data and by the resource sponsor, should occur prior to recall. If, however, IRR members will replace current active duty personnel in less demanding assignments, then time would be available for receiving units or some especially chartered intermediate activity to provide needed training.

Finally, based on (1) the IRR members' reports of their current relatively high residual levels of proficiency and (2) literature findings that maximum skill loss probably occurs after about 1 year of nonuse of skills, it appears that skill maintenance training is not strictly necessary for most IRRs. We do recommend it for the IRRs in the ratings just mentioned above, however. Skill deterioration effects, in these cases, did lower the IRRs' current proficiencies to the point where they could not be expected to be able to perform active duty job tasks at competency levels equivalent to those associated with current job incumbents. Maintenance training in these cases should preclude future adverse effects on proficiency. Again, however, firm conclusions about maintenance training must be weighed against planned utilization of recalled IRR members. For example, a casualty replacement scenario would make maintenance training more desirable than other scenarios.

SECTION V

CONCLUSIONS

Based on all data obtained during the study, a number of conclusions about the IRR, as represented by the 16 ratings studied, are possible. These are presented below in three areas: Data Base, Skill Deterioration, and IRR Training Needs.

DATA BASE

1. The incorrect address rate in the IRR data files is not desirable.

a. Mailing addresses were incorrect for approximately 30 percent of the CT IRRs.

b. Mailing addresses were incorrect for about 10 percent of the IRRs in the other 10 ratings.

2. The IRR data files may be incomplete or inaccurate in other areas. These deficiencies can lead to incorrect estimates of the size of the available manpower pool. The deficiencies involve data file content and procedures used in record keeping.

a. There were indications from the questionnaires returned that a segment (of unknown size) of IRRs listed in the files, who did not return questionnaires, may have, for example, reenlisted, passed their 60th birthday, or received final discharges.

b. Almost 53 percent of the total group had been in the IRR more than 3 years. The percentages were exceptionally high for CTs. The reasons why so few CTs were in the under 3 years since EAOS group is unknown, but a record keeping problem is indicated.

c. Many of the IRRs in the ratings studied may be beyond the zone of involuntary recall for mobilization.

d. No "Last Release from Active Duty" information was contained in the IRR data filed for approximately 7 percent of the names in the rating samples drawn. Purging the files when an individual's MSO expires poses a potential problem for accurate record keeping.

SKILL DETERIORATION

1. Deterioration of skills acquired on active duty does occur during the time that individuals are assigned to the IRR.

a. For most of the ratings studied, the proficiency of IRRs at the present time was reported to be less than the proficiency reported when they were on active duty.

2. Considerably less skill deterioration occurs for IRRs who, after EAOS, work in civilian jobs that are related to their Navy rating.

a. IRRs who work in a rating-related civilian job gained proficiency on some job tasks in 11 ratings. The gains ranged from 9 percent to 100 percent of the job tasks.

b. For 15 of the ratings studied, IRRs who work in a civilian job related to the rating lost less skill on job tasks than those not similarly employed.

3. Skill deterioration during IRR membership does not appear to be a major, general problem insofar as dictating needs for comprehensive retraining of IRRs to support mobilization.

a. For most of the ratings, the current proficiency levels of IRRs on rating job tasks compared favorably with the proficiency levels reported by individuals who are currently on active duty. Thus, many IRRs should be able to perform rating job tasks at mobilization without first being retrained.

4. Skill deterioration effects on current IRR proficiency were sufficient in five ratings to indicate some needs for formal retraining.

a. Disparities between active duty proficiency and current proficiency of IRRs in the CTI, CTO, and CTR ratings indicated training needs for all IRRs in these ratings.

b. Disparities between active duty proficiency and current proficiency of the IRRs in the CTT and FTM ratings indicated training needs for the IRRs who were not currently working in a civilian job related to their rating.

5. No firm conclusions about trends in skill deterioration over time were possible.

a. Mean proficiency values computed over all ratings for 6-month time intervals since EAOS remained relatively constant over the intervals. Sample sizes may have been too small for a reliable assessment of trends.

IRR TRAINING NEEDS

1. Comprehensive retraining and maintenance training for all IRR ATs, BUs, CTAs, EMs, EOs, ETs, HMs, OSs, and STGs and for the CTTs and FTMs who now work in civilian occupations related to their ratings appear to be unnecessary prior to mobilization recall. Familiarization training at recall consisting of supervised practice may suffice. This conclusion is subject to concurrence by subject matter experts.

2. Retraining and maintenance training for all CTIs, CTOs, CTRs and for the CTTs and FTMs not working in a civilian job related to their rating

may be necessary to support mobilization. Formal training is indicated. This conclusion is subject to concurrence by subject matter experts.

3. Skill upgrade training should be considered for all IRR personnel who have been off active duty for greater than 3 years. Subject matter experts should determine the specific upgrade training needed based on changes to equipment, procedures, and materials used in job performance.

4. Training needs for CTMs and GSEs could not be determined by the study because of the small sample sizes (11 and 10, respectively) available.

SECTION VI

RECOMMENDATIONS

A number of specific recommendations based on the findings of this study are provided below.

1. Review, validate, and update the content of the IRR data files to assure that accurate assessments of the size of the IRR manpower pool are available at all times. Areas that should be included in this review concern accuracy and completeness of data pertaining to mailing addresses, member status, dates for completion of the military service obligation, and currency (and existence) of agreements stating continuing membership in the IRR and availability for recall.

2. Review and correct, as necessary, the procedures used in updating and maintaining currency of the IRR data files. This recommendation stems partly from concerns of paragraph 1 above and partly from the pronounced lack of names in the IRR files of individuals separated from active service within the 3 years immediately preceding this study. In this regard, names for the CT ratings were most conspicuously absent.

3. Amend existing procedures where possible to obtain information from IRR members concerning civilian employment. At the very least, obtain this information from those eligible for, or receiving, bonuses for continued IRR service. Consider individuals working in rating-related jobs as first choice for mobilization recall.

4. Request resource sponsors review the data of this study:

   a. Determine if agreement can be reached that the tasks generated by schoolhouse SMEs adequately represent the rating jobs. Determine that the E-4 job is, in fact, acceptable as the target performance level for retraining IRRs. If so, establish the proficiency levels reported by current E-4s as target levels for training (and as a definition of the term "minimum proficiency" to support mobilization.

   b. Request resource sponsors consider the study data against factors such as changes to materials, procedures, equipment used by the rating; criticality of task performance; and mobilization plans for IRR personnel. Request resource sponsors promulgate IRR training requirements.

5. Task the Naval Education and Training Command to initiate development of premobilization curricula for all CTIs, CTOs, CTRs, and for CTTs and FTMs not working in the field. Use the data of this study to identify particular job tasks to receive training attention.

6. Consider recalling a sample of IRRs to assess their knowledge of current job requirements. Use this information to validate the data and conclusions of this study.

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APPENDIX A

DESCRIPTION OF JOBS PERFORMED BY RATING INCUMBENTS

This appendix provides brief descriptions of the jobs performed on active duty by individuals holding the ratings listed. All descriptions were taken from the Blue Jackets' Manual, 20th edition, United States Naval Institute.

JOB/TASK FUNCTIONS OF CRITICAL NAVY RATINGS

AVIATION ELECTRONICS TECHNICAN (AT):	ATs are responsible for the test, maintenance, and repair of radio, radar, and other electronic devices used for communications, navigation, controlled landing approaches, detection of (and guidance to) objectives, and neutralizing enemy equipment and tactics.
BUILDER (BU):	Navy BUs may be carpenters, plasterers, roofers, cement finishers, asphalt workers, masons, painters, bricklayers, sawmill operators, or cabinet makers. BUs build and repair all types of structures, including piers, bridges, towers, underwater installations, schools, offices, houses, and other buildings.
CRYPTOLOGIC TECHNICIAN (CT):	CTs control the flow of messages and information. The specific work they do depends on the career area in which they specialize. There are six areas.
Administrative (CTA):	CTAs perform administrative and clerical duties involved in controlling access to classified information;
Interpretive (CTI):	CTI duties include radiotelephone communications, and foreign language translation;
Maintenance (CTM):	CTMs install, service, and repair electronic and electromechanical equipment;
Communications (CTO):	CTOs operate Naval Security Group communications systems;
Collection (CTR):	CTR duties involve Morse code communications and operation of radio direction-finding equipment;
Technical (CTT):	CTT duties involve communications by means other than Morse code, and electronic countermeasures.
ELECTRICIAN'S MATE (EM):	EMs operate and repair electrical power plants and electrical equipments. They also maintain and repair power and lighting circuits, distribution switchboards, generators, motors, and other electrical equipment.

EQUIPMENT OPERATOR (EO):	EOs operate heavy machinery such as bulldozers, power shovels, pile drivers, rollers and graders, etc.
ELECTRONICS TECHNICIAN (ET):	ET duties involve maintaining, repairing, calibrating, tuning, and adjusting all electronic equipment used for communications, detection and tracking, recognition and identification, navigation, and electronic countermeasures.
FIRE CONTROL TECHNICIAN (SURFACE MISSILE) (FTM):	FTMs maintain and repair fire control systems, including radars, weapons direction systems, target designation systems, and electro-hydraulic fire-control servo-mechanisms.
GAS TURBINE SYSTEM TECHNICIAN (ELECTRICICAL) (GSE):	GSEs operate, repair, and maintain gas turbine engines, main propulsion machinery (including gears, shafting and controllable pitch propellers), assigned auxiliary equipment, propulsion control systems, electrical and electronic circuitry up to the printed circuit modules, and alarm and warning circuitry. They perform administrative tasks related to gas turbine propulsion system operation and maintenance.
HOSPITAL CORPSMAN (HM):	HMs assist medical professionals in providing health care to service people and their families. They act, for example, as pharmacists, medical technicians, food service personnel, nurses' aids, physicians' or dentists' assistants, battlefield medics, X-ray technicians. HMs' work falls into several categories: first aid and minor surgery, patient transportation, patient care, prescriptions and laboratory work, food service inspections, and clerical duties.
OPERATIONS SPECIALIST (OS):	OSs operate radar, navigation, and communications equipment in shipboard combat information centers or on bridges. They detect and track ships, planes, and missiles. They operate and maintain IFF (identification friend or foe) systems, ECM (electronic countermeasures) equipment, and radio telephones.

SONAR TECHNICIAN (SURFACE) (STG)	STGs are responsible for underwater surveillance, assistance in safe navigation, aiding in search and rescue, and attack operations. They operate and repair sonar equipment and jam enemy sonars. They track underwater objects and repair antisubmarine warfare fire-control equipment and underwater radio telephones.

APPENDIX B

ACTIVITIES VISITED FOR JOB TASK INFORMATION

This appendix identifies the activities visited to obtain job task information needed for the IRR study of skill deterioration. Commands granting visit authorization are also identified.

The table below identifies Naval commands granting authorization for visits by NAVTRASYSCEN project staff to obtain information needed for the IRR skill deterioration study. The rating involved is identified and the location of the "A" School, or other activity, providing SME assistance is given. Concurrence of Chief of Naval Education and Training (CNET) was obtained for CNET's subordinate commands.

Table B-1

Activities Providing Job Task Information

Rating	Location
A. Chief of Naval Technical Training	
Electrician's Mate (EM)	Service School Command, Great Lakes, IL
Electronics Technician (ET)	Service School Command, Great Lakes, IL
Fire Control Technician (Surface Missile) (FTM)	Service School Command, Great Lakes, IL
Gas Turbine Systems Technician (Electrical) (GSE)	Service School Command, Great Lakes, IL
Builder (BU)	Naval Construction Training Center, Gulfport, MS
Equipment Operator (EO)	Naval Construction Training Center, Gulfport, MS
Aviation Electronics Technician (AT)	Naval Air Technical Training Center, Memphis, TN
Cryptologic Technician (Administrative) (CTA)	Naval Technical Training Center, Corry Station, Pensacola, FL
Cryptologic Technician (Maintenance) (CTM)	Naval Technical Training Center, Corry Station, Pensacola, FL
Cryptologic Technician (Communications) (CT)	Naval Technical Training Center, Corry Station, Pensacola, FL
Cryptologic Technician (Collection) (CTR)	Naval Technical Training Center, Corry Station, Pensacola, FL
Cryptologic Technician (Technical) (CTT)	Naval Technical Training Center, Corry Station, Pensacola, FL
Cryptologic Technician (Interpretive) (CTI)	Naval Technical Training Center Detachment, Goodfellow AFB, TX

Table B-1 (Continued)

Rating	Location
B. Commander Training Command, U.S. Pacific Fleet	
Sonar Technician (Surface) (STG)	Fleet Anti-Submarine Warfare Training Center, Pacific, San Diego, CA
C. Commander Training Command, U.S. Atlantic Fleet	
Operations Specialist (OS)	Fleet Combat Training Center, Atlantic, Dam Neck, VA
D. Commander, Naval Regional Medical Center	
Hospital Corpsman (HM)	Staff, Navy Hospital, Orlando, FL

APPENDIX C

COVER LETTERS USED FOR TRANSMISSION OF QUESTIONNAIRES

This appendix provides copies of cover letters used to transmit questionnaires to both IRR personnel and active duty personnel in the following order:

Sample IRR Questionnaire Transmittal Letter

Follow-up Transmittal Letter to IRR Personnel

Transmittal Letter to Unit/Activity Commanders

Letter to Active Duty Personnel

SAMPLE IRR QUESTIONNAIRE TRANSMITTAL LETTER

DEPARTMENT OF DEFENSE

DEPARTMENT OF THE NAVY
OFFICE OF THE CHIEF OF NAVAL OPERATIONS
WASHINGTON, DC 20350

IN REPLY REFER TO
1001
Ser 113E2/368487

From: Director, Total Force Manpower Requirements, Education and Training Division (OP-11)
To:

Subj: REQUEST FOR INFORMATION

Encl: (1) Skill Retention Questionnaire

1. The Navy is currently reviewing the Individual Ready Reserve (IRR) program. The IRR consists of Navy personnel who have fulfilled their active duty obligation and are now assigned to the inactive reserve until completion of their service contract. As a member of the IRR, you can help us by completing and returning the enclosed questionnaire.

2. During your active service you acquired specific professional and technical skills critical to the performance of your rate. The purpose of this questionnaire is to determine how many, if any, of these skills have been lost since your release from active duty. We are conducting this survey as part of a study to determine what training you would need to retain, regain or upgrade these skills should some future national emergency make it necessary to recall reserve forces to active duty.

3. Your participation is strictly voluntary, but it is important. I urge you to take a few minutes and complete the attached questionnaire. Please answer all questions to the best of your knowledge. Then fold the paper so the return address is on the outside, tape or staple it closed and drop the survey in the mailbox. No postage is needed. Your prompt responses would be greatly appreciated.

4. I wish to thank your for your time and cooperation. Your participation will help to improve Naval readiness in the event of national emergency.

D. G. Primeau
D. G. PRIMEAU
Director, Total Force
Manpower Requirements, Education
and Training Division

FOLLOW-UP TRANSMITTAL LETTER TO IRR PERSONNEL

DEPARTMENT OF THE NAVY
NAVAL TRAINING EQUIPMENT CENTER
ORLANDO, FLORIDA 32813

IN REPLY REFER TO:
1500
Ser 1/186
W1213
[illegible]

From: Commanding Officer, Naval Training Equipment Center
To: Navy Individual Ready Reserve Member

Subj: SECOND REQUEST FOR INFORMATION

Encl: (1) Skill Retention Questionnaire

1. Recently, you received a letter from the Office of the Chief of Naval Operations. A questionnaire asking about your former Navy job was enclosed. The questionnaire sought information that only former service personnel like you can provide, information about how Navy skills change after an individual's separation from active duty.

2. We have not received a response from you. In case you have mislaid the original questionnaire, a new copy is enclosed. Your participation is strictly voluntary, but it is important. Please take a few minutes to answer the questions. Then fold the paper so the return address is on the outside, tape or staple it closed, and drop the survey in a mailbox. No postage is needed.

3. I wish to thank you for taking the time to complete the questionnaire. Your information is needed to support Navy long-term planning.

DAVID E. OSBURN

TRANSMITTAL LETTER TO UNIT/ACTIVITY COMMANDERS

DEPARTMENT OF DEFENSE

DEPARTMENT OF THE NAVY
OFFICE OF THE CHIEF OF NAVAL OPERATIONS
WASHINGTON, DC 20350

5223 IN REPLY REFER TO
Ser 01R1/
16 SEP 1985

From: Chief of Naval Operations
To:

Subj: INDIVIDUAL READY RESERVE (IRR) STUDY

Ref: (a) CNO ltr ser 113E/368974 of 28 Nov 83
(b) COMNAVSECGRU ltr 5223 Ser G131/1723 of 18 Jan 85 (NOTAL)
(c) CINCLANTFLT ltr 5223 Ser N141A/001131 of 4 Feb 85 (NOTAL)
(d) CINCPACFLT ltr 5223 Ser 73/3186 of 15 Apr 85 (NOTAL)

Encl: (1) Listing of Personnel To Be Surveyed
(2) Individual Requests For Information

1. The Naval Training Equipment Center (NAVTRAEQUIPCEN) has been tasked in reference (a) to study skill degradation and retraining requirements. As part of the study, it is necessary to survey some of your active duty personnel. Enclosure (1) lists those personnel who have been randomly selected and are reported to be in your command. Please distribute the appropriate portions of enclosure (2) to the designated personnel. Completed questionnaires are to be mailed by 31 October 85 directly to the NAVTRAEQUIPCEN (Code 10), Orlando, Florida, 32813. If personnel listed are no longer attached to your command, return the blank questionnaire to NAVTRAEQUIPCEN with a notation of the appropriate address if known.

2. This fleet survey is authorized by references (b), (c) and (d). The survey will provide invaluable information in determining what retraining, regaining, or upgrading should take place should a national emergency make it necessary to recall IRR personnel to active duty. OPNAV Report Control Symbol RCS:OPNAV 1514-2(OT) has been assigned to this survey and is valid until 31 December 85.

JE Taylor
J. E. TAYLOR
Assistant Deputy Chief of
Naval Operations (Manpower,
Personnel and Training) Acting

LETTER TO ACTIVE DUTY PERSONNEL

DEPARTMENT OF THE NAVY
OFFICE OF THE CHIEF OF NAVAL OPERATIONS
WASHINGTON, DC 20350

IN REPLY REFER TO
5223
Ser 01R1/

From: Chief of Naval Operations
To:

Subj: REQUEST FOR INFORMATION

Encl: (1) Job/Task Performance Questionnaire

1. Your participation is important. Please complete enclosure (1) by answering all questions to the best of your knowledge. Then fold the paper so the return address is on the outside, tape or staple it closed, and drop the survey in the mailbox. No postage is needed. Your prompt response will be greatly appreciated.

2. During your active Naval service, you have acquired specific skills critical to the performance of your rating. The purpose of enclosure (1) is to determine what skills are currently used and your proficiency in performing that skill, and your estimate of how well you could perform the same skills after a two year separation from the Navy.

3. The Navy is currently reviewing the Individual Ready Reserve (IRR) program. The IRR consists of Navy personnel who have been released from active duty but have not completed their military service obligation and are now assigned to the reserve until completion of this obligation. This survey is part of a study to determine what training is necessary to retrain the IRR personnel in critical skills should a national emergency make it necessary to recall reserve forces to active duty.

4. I wish to thank you for your time and cooperation. Your participation will help to improve Naval readiness.

JE Taylor
J. E. TAYLOR
Assistant Deputy Chief of
Naval Operations (Manpower,
Personnel and Training)Acting

APPENDIX D

STUDY RESULTS FOR 16 RATINGS

DESCRIPTION OF CONTENTS

Appendix D is composed of 16 annexes. Each annex presents the results of this skill deterioration study for one particular rating (e.g., HM, ET). Each annex is a stand-alone document that may be separated from this report for the convenience of those interested only in (a) particular rating(s). All 16 annexes are identically formatted. A brief introduction, followed by a concise summary of the technical approach, is given. Study results pertaining to the particular rating are presented next. Comments pertinent to data interpretation are provided. Finally, conclusions pertaining to needs for training of IRR members, and recommendations based on the data are presented.

The annexes and the rating covered by each are listed below:

Annex	Rating Covered
1	AT
2	BU
3	CTA
4	CTI
5	CTM
6	CTO
7	CTR
8	CTT
9	EM
10	EO
11	ET
12	FTM
13	GSE
14	HM
15	OS
16	STG

APPENDIX D

ANNEX 1

AVIATION ELECTRONICS TECHNICIAN (AT): SKILL DETERIORATION DURING NAVY INDIVIDUAL READY RESERVE (IRR) MEMBERSHIP

INTRODUCTION

Following a first-tour of active duty, Naval personnel who do not elect other reserve options are assigned to the Individual Ready Reserve (IRR) to complete a specified Military Service Obligation (MSO). Other personnel may voluntarily enlist in the IRR. IRR members, typically in a nonpay, nondrill status, are subject to recall to active duty if mobilization of the Armed Forces is ordered. A major concern of mobilization planners is that the skills acquired on active duty may deteriorate over time under the IRR condition of nonuse. This raises the question of the contribution that can be made by recalled IRR service members. To determine the extent and nature of skill deterioration during IRR membership, the Naval Training Systems Center (NAVTRASYSCEN), Code 10, conducted an assessment study. The study was performed at the request of the Chief of Naval Operations (OP-01R1).

This study assessed skill deterioration for 16 critical Navy ratings identified by OP-01. The designation "critical" was based on the criterion of projected personnel shortfalls for mobilization. The Aviation Electronics Technician (AT) rating was one of these 16.

PURPOSE OF THE STUDY

The purpose of the study was to assess skill deterioration during IRR membership and determine needs for training IRR personnel to restore, upgrade, or maintain their skills at minimum proficiency levels to support mobilization. Implicit in the tasking was the additional requirement to define minimum, or acceptable, proficiency.

In a general sense, acceptable proficiency refers to the ability of a recalled ready reservist to make an effective contribution to a receiving unit's mission. In a more specific sense, it refers to ability to perform a defined set of job tasks at a defined level of competency. Performance proficiency information was essential to establish a baseline around which obtained skill deterioration information could be assessed, and to define the terminal performance goals that any proposed training regimen should attempt to achieve.

APPROACH

Complete details of the technical approach to the study are presented in the main body of this report. A brief description is presented here.

Mail-out questionnaires were used to obtain information. Four senior enlisted ATs, assigned to the Aviation Electronics Technician School, Naval Air Station, Memphis, TN, served as subject matter experts (SME) for questionnaire development. Under guidance given by the project staff, the AT SMEs selected from various source materials a set of job tasks that, in their judgment, best represented the job (non-NEC specific) of an active duty AT-3. This level was chosen in the belief that a recalled ready reservist who could perform job tasks competently at the E-4 level would make a positive work contribution to a receiving unit.

The AT-3 job task statements were used on questionnaires mailed to IRR and active duty personnel. Information sought concerned tasks performed and the level of competency attached to the performance of each. Level of competency was defined in terms of the amount of supervision needed to perform specific job tasks.

Questionnaires mailed to IRR personnel requested information about proficiency on each job task at the End of Active Obligated Service (EAOS) and at the present time (NOW). The difference between proficiency at EAOS and current proficiency would reflect skill deterioration during IRR membership.

Questionnaires mailed to active duty AT-3s requested information about current proficiency on job tasks and proficiency expected after 2 years of nonperformance of the job tasks. The current proficiency estimates were needed to define criterion job performance for an active duty AT-3. The data reflecting what is currently done on the job would define an acceptable level of performance. These data could be used as a baseline for judging amount and consequences of IRR skill deterioration. They also set an upper limit on the proficiency levels that training must achieve to maintain at or restore skills to acceptable levels. Copies of these data collection instruments are shown in the next section.

As of 25 September 1984, 1,025 ATs were listed in Naval Military Personnel Command (NMPC) computer files as assigned to the IRR. Names and addresses were obtained from NMPC through the Naval Reserve Personnel Center (NAVRESPERSCEN). Questionnaires were mailed on 21 November 1984 under CNO (OP-11) cover letter to a random sample of 500 (48.8 percent). Because of a low initial return rate, a follow-up mailing (340) was made on 29 January 1985. Questionnaire returns were accepted until 28 February 1985.

Coordination with Commander in Chief, U.S. Atlantic Fleet (CINCLANTFLT), Commander in Chief, U.S. Pacific Fleet (CINCPACFLT), and within CNO (OP-01) was accomplished for authorization to survey active duty AT-3 personnel. An AT-3 roster, current as of 2 August 1985, was obtained from NMPC. From a pool of 2,634, a sample of 427 AT-3s was determined using accepted survey research methods. Questionnaires were mailed on 18 September 1985 under CNO (OP-11) cover letter to unit/activity commanding officers for distribution to AT-3s named. Returns were accepted until 31 December 1985. Returned questionnaires were scanned to determine data usability, and data were entered into computer files. Subsequently, summaries of the information of interest to the study were prepared.

RESULTS

Results pertinent to the assessment of AT skill deterioration are presented in this section.

QUESTIONNAIRE RETURN STATISTICS

Table D-1-1 shows, for both the IRR and active duty ATs, the number of questionnaires mailed and number and percent of usable returns. For the IRR

sample, the number/percent of nonvalid returns (nonvalid principally because of data base errors) is also shown. Percent usable returns was derived by dividing the number returned (214) by the number delivered (i.e., 500 - 46 = 454).

Table D-1-1

Questionnaire Return Statistics

Sample	No. Mailed	Usable Returns No.	%	Nonvalid No.	%
IRR	500	212	47	46	9
Active Duty	427	257	60		

QUESTIONNAIRE DATA SUMMARIES

Summaries of data obtained from the questionnaires are presented in table D-1-2 for IRR personnel and in table D-1-3 for active duty personnel. The tables are modified questionnaire forms.

Background Questions

Of 208 IRR ATs answering the question, 110 (approximately 53 percent) reported that they now work in a civilian occupation related to their Navy AT rating. Answers to the remaining two background questions for IRRs (see table D-1-2) are not reported since it was determined that the answers would be redundant and could not be unambiguously interpreted. Of the active duty respondents answering the background questions (see table D-1-3), 233 of 254 (92 percent) work in rating. Ninety-eight of 252 (39 percent) are assigned sea duty.

Task Performance Data

The data summary tables (D-1-2 and D-1-3) show the number (F) and percent (%) of respondents reporting that they had never performed particular job tasks (i.e., they responded to the task description with a "1.") For IRRs, these data refer to the "at EAOS" answers and for active duty to the current (NOW) level of ability. A rank-order correlation (see Siegel, 1956) computed between the two sets of data ($\underline{r}_s = .785$, $p < .05$) indicated significant agreement between the two classes of respondents. Thus, tasks which have not been performed frequently by active duty ATs (to date) are the same tasks that had not been performed frequently by IRRs at EAOS.

Tables D-1-2 and D-1-3 also show, for each task listed on a questionnaire, mean values for performance proficiency/competency, the

Table D-1-2

Overall Summary of AT IRR Questionnaire Data

PART 1:

1. If necessary, correct your Service Number.
2. Is the work which you do NOW related to your Navy rating?
   Yes 110 No 98
3. Have you done PREVIOUS work which is related to your Navy rating since your Expiration of Active Obligated Service (EAOS)?
   Yes - No -
4. Have you received training related to your Navy rating since your Expiration of Active Obligated Service (EAOS)?
   Yes - No -

ANSWER KEY:

(1) Have never performed the task.

(2) Can/could do simple parts of the task (need direct supervision).

(3) Can/could do most parts of the task (need general supervision).

(4) Can/could do all parts of the task (need only occasional supervision. Meets minimum local speed and accuracy standards.)

(5) Can/could do complete task quickly and accurately (need no supervision).

PART 2:

For each job task statement below:

A. Indicate your CURRENT level of ability according to the answer key above.

B. Estimate your PREVIOUS level of ability at the time of your EAOS according to the answer key above.

"(1)" Choices				A			B		
F	%		Tasks	N	Mean	SD	N	Mean	SD
12	5.7	1.	Troubleshoot electronics circuits to a defective component.	211	3.64	1.299	209	3.75	1.239
28	13.5	2.	Repair or replace defective components on a circuit card.	210	3.82	1.442	208	3.66	1.425
4	1.9	3.	Use general purpose test equipment (e.g., o-scope, multimeters) to measure voltages and resistance, and to observe waveforms.	211	4.31	1.013	208	4.31	1.013
12	5.8	4.	Isolate malfunctions to a line replaceable unit.	209	4.06	1.167	207	4.29	1.016
7	3.3	5.	Assist in troubleshooting and repair of avionics systems.	210	3.81	1.207	209	4.27	1.036
6	2.9	6.	Use schematics/block diagrams to maintain avionics equipment.	210	4.08	1.126	208	4.32	1.000

Table D-1-2 (Continued)

10	4.8	7. **Assist in maintaining the technical library, tool inventory, training records, and test equipment inventory.**	210	3.81	1.230	208	4.16	1.087
8	3.9	8. **Fabricate, test and repair interconnecting electronic cables.**	209	4.16	1.147	207	4.22	1.041
8	3.9	9. **Use publications and maintenance information retrieval system to inspect, service, and maintain avionics systems.**	208	3.76	1.246	205	4.19	1.075
5	2.4	10. **Comply with Foreign Object Damage (FOD) Program.**	207	4.22	1.205	205	4.65	.842
26	12.5	11. **Using MRC cards, perform daily, preflight, postflight, turnaround, and conditional inspections of aircraft and avionics equipment.**	211	3.39	1.451	208	3.96	1.421
9	4.3	12. **Complete maintenance data forms (MAF/SAF).**	209	3.38	1.212	208	4.32	1.048
33	15.8	13. **Prepare aircraft for ground maintenance and obtain necessary ground support equipment.**	211	3.12	1.441	209	3.76	1.506
15	7.2	14. **Identify and treat corrosion; apply corrosion prevention measures.**	210	3.50	1.284	209	4.02	1.226
6	2.9	15. **Inspect and replace electrical circuit protective devices (e.g., fuses, circuit breakers).**	210	4.52	.960	209	4.64	.883
5	2.4	16. **Inspect, clean, and service avionics equipment or systems.**	210	4.18	1.095	208	4.56	.877
3	1.4	17. **Use and maintain handtools.**	210	4.74	.664	208	4.77	.684
7	3.6	18. **Secure and safety wire equipment and components.**	198	4.24	1.166	195	4.51	.981
		19. **To what level of maintenance were you assigned while on active duty (O, I, both, neither)?**						

Overall Mean: 3.94

Table D-1-3

Overall Summary of AT Active Duty Questionnaire Data

PART 1:

1. If necessary, correct your Service Number.
2. Does your current billet require you to work in your Navy rating?
   Yes 233 No 21
3. What type duty is your current billet?
   Sea 98 Shore 154

ANSWER KEY:

(1) Have never performed the task.

(2) Can/could do simple parts of the task (need direct supervision).

(3) Can/could do most parts of the task (need general supervision).

(4) Can/could do all parts of the task (need only occasional supervision. Meets minimum local speed and accuracy standards.)

(5) Can/could do complete task quickly and accurately (need no supervision).

PART 2:

For each job task statement below:

A. Use the answer key above to indicate your CURRENT level of ability.

B. Use the answer key above to estimate your EXPECTED level of ability after 2 years of not performing these tasks.

"(1)" Choices				A			B		
F	%		Tasks	N	Mean	SD	N	Mean	SD
8	5.4	1.	Troubleshoot electronics circuits to a defective component.	257	3.70	1.115	249	3.00	.952
41	16.0	2.	Repair or replace defective components on a circuit card.	256	3.53	1.458	247	3.10	1.244
5	1.9	3.	Use general purpose test equipment (e.g., o-scope, multimeters) to measure voltages and resistance, and to observe waveforms.	257	4.50	.871	252	3.79	1.005
24	9.4	4.	Isolate malfunctions to a line replaceable unit.	254	4.05	1.215	249	3.29	1.102
11	4.3	5.	Assist in troubleshooting and repair of avionics systems.	256	4.23	1.038	249	3.51	1.036
6	2.3	6.	Use schematics/block diagrams to maintain avionics equipment.	256	4.33	.913	250	3.66	1.034

Table D-1-3 (Continued)

9	3.5	7. Assist in maintaining the technical library, tool inventory, training records, and test equipment inventory.	257	3.98	1.079	252	3.37	1.151
24	9.3	8. Fabricate, test and repair interconnecting electronic cables.	257	3.93	1.254	250	3.46	1.199
9	3.5	9. Use publications and maintenance information retrieval system to inspect, service, and maintain avionics systems.	257	4.19	.958	250	3.54	1.014
5	2.0	10. Comply with Foreign Object Damage (FOD) Program.	256	4.71	.748	250	4.38	.942
46	17.9	11. Using MRC cards, perform daily, preflight, postflight, turnaround, and conditional inspections of aircraft and avionics equipment.	257	3.74	1.517	252	3.33	1.362
5	2.0	12. Complete maintenance data forms (MAF/SAF).	254	4.29	.911	249	3.27	1.023
82	32.2	13. Prepare aircraft for ground maintenance and obtain necessary ground support equipment.	255	3.19	1.725	249	2.81	1.473
8	3.1	14. Identify and treat corrosion; apply corrosion prevention measures.	257	4.09	1.017	251	3.41	1.104
8	3.1	15. Inspect and replace electrical circuit protective devices (e.g., fuses, circuit breakers).	256	4.71	.819	252	4.39	.941
6	2.3	16. Inspect, clean, and service avionics equipment or systems.	257	4.49	.862	251	3.98	1.002
5	1.9	17. Use and maintain handtools.	257	4.81	.666	253	4.62	.825
24	9.6	18. Secure and safety wire equipment and components.	251	4.10	1.283	247	3.77	1.306
		19. To what level of maintenance were you assigned while on active duty (O, I, both, neither)?						

standard deviation (SD) around the mean, and the number of cases (n) on which a mean is based. For the IRR sample, table D-1-2, the "A" column reflects current average ability level; the "B" column, EAOs, average ability level. For the active duty sample (table D-1-3), the "A" column refers to current (NOW) ability and the "B" to proficiency expected after 2 years of nonperformance of a task.[1] A Pearson Product Moment Correlation ($r = .911$, $p < .05$) computed between task means for IRR EAOS and active duty NOW (current proficiency) values indicated that the IRR members, while on active duty, performed job tasks at competency levels equivalent to those of current job incumbents.

For the IRR group, an overall grand mean for current proficiency was computed over all tasks for the rating. This single number indicates that considering the AT-3 job in its entirety (as reflected by the tasks used) the average IRR member feels that he could now perform tasks of the rating at a level where only occasional supervision would be needed (mean = 3.9).

For the active duty group, means reflecting proficiency on each job task for ATs working/not working in their rating were computed. These are shown in table D-1-4. Again, the expected-after-2-years data are provided for information only.

SKILL DETERIORATION

Table D-1-5 displays task proficiency means for two subgroups of the AT IRR respondents: (1) those who answered that they were now working, "W," in a field related to the Navy AT rating and (2) those who indicated that they were not working in a related field, "N." Both EAOS and NOW (current) proficiency means are given. These means, as well as those in table D-1-4, were computed from choices of 2, 3, 4, or 5 from the answer key. These choices place proficiency along a continuum from "Need direct supervision" through "Need no supervision."

As mentioned earlier, skill deterioration is reflected by differences between EAOS proficiency and NOW proficiency. In table D-1-5, values preceded by a minus sign represent a decrease in proficiency during IRR membership: current proficiency is less than EAOS proficiency. Values with no signs indicate increases in proficiency.

The table shows that ATs who now work ("W") in a field related to their former active duty jobs gained proficiency on 7 of the 18 job tasks. Although the individual task differences are not large, this "W" group also reported less skill deterioration than the "N" group for all but one of the other rating tasks. Statistical tests (t tests for independent means; see Guilford and Fruchter, 1973) indicated that over all tasks of the rating, proficiency of the two subgroups was equivalent at EAOS ($t = .34$, $p < .3664$).

---

[1] These expected-after-2-years proficiency values were not used in subsequent analyses, however, since it was clear that many respondents did not understand the question being asked.

Table D-1-4

Task Mean Values for Two Subgroups of Active Duty ATs

	Not Working ("N")[1]		Working ("W")[2]	
Task	NOW	EXP	NOW	EXP
1	3.778	2.722	3.857	3.081
2	3.813	3.375	4.030	3.387
3	4.111	3.632	4.610	3.842
4	4.235	3.368	4.386	3.476
5	4.105	3.556	4.404	3.579
6	4.056	3.333	4.437	3.709
7	4.211	3.944	4.062	3.394
8	4.222	3.611	4.229	3.633
9	4.176	3.588	4.307	3.571
10	4.700	4.368	4.789	4.433
11	4.286	3.800	4.338	3.704
12	4.053	3.100	4.383	3.318
13	4.462	3.786	4.203	3.553
14	3.944	3.389	4.215	3.467
15	4.722	4.278	4.833	4.484
16	4.235	3.813	4.589	4.035
17	4.750	4.429	4.900	4.714
18	4.286	4.000	4.424	3.976

Composite Mean:	Group W	NOW	4.389
		EXP	3.742
	Group N	NOW	4.230
		EXP	3.672
Overall Mean:		NOW	4.309
		EXP	3.707

[1] n = 21
[2] n = 233

Table D-1-5

Task Mean Values for Two Subgroups of IRR ATs

	Not Working ("N")[1]		Working ("W")[2]		Mean Difference	
Task	NOW	EAOS	NOW	EAOS	"N"	"W"
1	3.221	3.711	4.368	4.087	-0.490	0.281
2	3.737	3.946	4.615	4.194	-0.209	0.421
3	3.918	4.277	4.750	4.467	-0.359	0.283
4	3.769	4.371	4.625	4.583	-0.602	0.042
5	3.702	4.337	4.273	4.423	-0.635	-0.150
6	3.787	4.271	4.552	4.553	-0.484	-0.001
7	3.854	4.370	4.206	4.291	-0.516	-0.085
8	3.978	4.326	4.571	4.356	-0.348	0.215
9	3.725	4.341	4.150	4.291	-0.616	-0.141
10	4.484	4.777	4.396	4.721	-0.293	-0.325
11	3.765	4.470	3.944	4.302	-0.705	-0.358
12	3.438	4.457	3.786	4.490	-1.019	-0.704
13	3.623	4.405	3.767	4.181	-0.782	-0.414
14	3.787	4.411	3.663	4.139	-0.624	-0.476
15	4.333	4.663	4.876	4.819	-0.330	0.057
16	4.126	4.663	4.545	4.619	-0.537	-0.074
17	4.680	4.821	4.861	4.822	-0.141	0.039
18	4.368	4.744	4.500	4.545	-0.376	-0.045

Composite Mean:	Group W	NOW	4.358
		EOS	4.438
	Group N	NOW	3.905
		EOS	4.409
Overall Mean:		NOW	4.132
		EOS	4.423

---

[1] n = 98
[2] n = 110

Task mean proficiency values, however, differed significantly ($t = 3.66$, $p < .0004$) for current (NOW) proficiency.

TIME IN IRR

Table D-1-6 provides a breakdown of AT personnel by time spent in the IRR prior to mail out of the questionnaires. The table also shows mean values assigned for proficiency for 6-month intervals of IRR time, and for those IRRs who have been off active duty more than 3 years.

Table D-1-6

Mean Proficiency Values for AT IRR Respondents by Time Since EAOS

Time (Mos.) Since EAOS	Mean	No. of Cases
0-5	3.79	28
6-11	3.82	20
12-17	3.85	39
18-23	4.09	6
24-35	4.21	14
36+	4.00	75
Overall Mean	3.94	182

COMMENTS AND OBSERVATIONS

Comments and observations on the data are offered here. As warranted, interpretations are made and discussed. These interpretations provide the basis for certain conclusions about skill deterioration and retraining needs. Our conclusions are based on best available data. However, they are subject to validation. The low questionnaire return rates coupled with the uncertain quality of the IRR data base (discussed below) require cautious inferences and limit generalizations. Nevertheless, the results do provide much useful information about the IRR that has not been available previously. They also suggest directions that should be taken with respect to the management and utilization of the IRR resource.

COMMENTS ON DATA BASE

Approximately 9 percent of questionnaires returned were classified as "nonvalid" (table D-1-1). They reflect probable errors in the IRR data base. The nonvalid category included, most prominently, questionnaires returned by the Postal Service as undeliverable (bad addresses). It also included, but to a much smaller extent, questionnaires returned by respondents with comments such as: "No longer in IRR, returned to active duty, already received final discharge. Retiree recruited from another service, was never on active duty in the Navy." (All information concerning such cases was transmitted to the Naval Reserve Personnel Center on 26 September 1985). Finally, a very few questionnaires were returned by individuals who refused to provide information and, some, by relatives marked, "Deceased." From the above data, it can be concluded that about 9 percent of the AT IRRs could not or would not be available for a mobilization call.

Questionnaires were presumably delivered by the Postal Service to a number of IRR ATs (53 percent) from whom no information was received. It is likely that many did not respond for reasons such as those cited above--they felt the questionnaire was not applicable. A further group, of unknown size, then would also be unavailable for mobilization because they are not in the viable IRR manpower pool as is currently believed. These considerations prompt a recommendation for review and validation of the AT IRR roster.

Another data base issue that should be examined concerns the amount of time that IRR AT respondents have been away from active duty. This information is given in table D-1-6. Forty-one percent were in the IRR for more than 3 years. Two issues emerge: (1) the need for skill upgrading and (2) availability of IRR members. Upgrade training because of new equipment, procedures, or material may be required for this group despite their beliefs (table D-1-6) in their continuing ability to perform job tasks at a fairly high level.

A second consideration concerns the military service obligation (MSO). Those who are liable for a 6- or 8-year MSO (depending on when they entered on active duty) may be involuntarily recalled. Those who are beyond the MSO may only be recalled under existing agreements. If these agreements do not exist, still fewer individuals may be actually recallable for mobilization. The size of the available IRR manpower pool may be overestimated. Again, the recommendation is made that this data base be reviewed and validated if this is not already occurring.

SKILL DETERIORATION

Information directly pertinent to the question of skill deterioration was presented in table D-1-5. In table D-1-5, differences between mean values at EAOS and NOW (current proficiency) are shown. Values preceded by a minus sign represent skill deterioration potentially attributable to time spent in the IRR.

Approximately 53 percent of AT IRRs reported that they now work in a civilian occupation related to the AT rating and the effects of this work experience on skill deterioration will be considered next. As table D-1-5 shows, ATs who now work in a field related to their Navy rating actually gained proficiency on seven job tasks. They also reported less skill deterioration than the "N" subgroup for all but one other job task. Taken over all tasks, differences between the current (NOW) proficiency means for the two subgroups were statistically significant. Also, they could not be attributed to initial differences between the groups at EAOS. Thus, civilian AT-related employment significantly affected skill deterioration. Those continuing to work in the field after EAOS reported less deterioration. The tasks on which the greatest amount of skill deterioration occurred are easily identifiable from table D-1-5.

TRAINING NEEDS

While skill deterioration information is of interest in its own right, the more important concern of this study is with determining the need for training IRR personnel prior to a mobilization recall. Thus, the implications of skill deterioration data must be assessed against the criterion of acceptable level of proficiency. This can be done most directly by comparing the current proficiency levels reported by AT IRRs against the levels reported by active duty AT-3s. The task means for the active duty sample can be taken as E-4 criterion performance since they reflect the level of proficiency claimed by the average AT-3 now on active duty.

The meaning of specific numerical values reported for task means must be clearly understood before conclusions about skill deterioration or training needs can be addressed. Attention is directed to the "answer key" shown on either table D-1-2 or D-1-3. The answer key shows that a value of "4," for example, represents skilled performance with only a need for occasional supervision. Following conventional practice, we assume that a "4" is reflected by any values between 3.50 and 4.49. A "3" is interpreted similarly. Skill deterioration may be shown by lower mean values for NOW (i.e., current) versus EAOS proficiency. However, the change from EAOS scores may not be sufficient to move the IRR respondents to a lower proficiency category. For example, sizable skill loss on tasks 10 to 15 occurred for the IRRs working in a related field. However, the losses reported resulted in the IRRs remaining in the "4" category (see table D-1-5). We would conclude that the deterioration is of no consequence insofar as signaling a need for retraining.

Assessment of the need for training IRR personnel to support mobilization should proceed with the application of similar logic. Table D-1-7 below presents the task mean values reported for current proficiency by IRR personnel who are not working in a field related to the AT rating and also for those who are working in a related field. These values are from table D-1-5. Task proficiency means for active duty personnel working in their rating (taken from table D-1-4) are also shown in table D-1-7. Inspection of the data shows that all values are essentially "4"s for those ATs working in a field related to the rating, and not much lower for those not working in a related field. The lowest mean value reported, 3.2 for task 1, still indicates the ability to do most parts of the task with only general supervision. Hence, from these data alone, a fair conclusion is that training of AT IRRs with the possible exception of the two tasks shown would not be required before mobilization to bring proficiency to an acceptable level.

Table D-1-7

Task Mean Proficiency Values for IRR and Active Duty ATs

	IRR		Active Duty
Tasks	Not in Field	In Field	In Rating
1	3.2*	4.4	3.9
2	3.7	4.6	4.0
3	3.9	4.8	4.6
4	3.8	4.6	4.4
5	3.7	4.3	4.4
6	3.8	4.6	4.4
7	3.9	4.2	4.1
8	4.0	4.6	4.2
9	3.7	4.2	4.3
10	4.5	4.4	4.8
11	3.8	3.9	4.3
12	3.4*	3.8	4.4
13	3.6	3.8	4.2
14	3.8	3.7	4.2
15	4.3	4.9	4.8
16	4.1	4.5	4.6
17	4.7	4.9	4.9
18	4.4	4.5	4.4

*Probable training need.

From our assessment, there seems to be no need for extensive retraining or maintenance training of ATs prior to mobilization. The average IRR AT should be able to perform required job tasks at an appropriate level of competency with a modicum of refamiliarization at mobilization. For the most part, this could probably be given by close, corrective supervision while the returnee is performing job tasks. This conclusion pertains to all ATs but is probably especially relevant to the 53 percent of IRR ATs who continue to work in an AT-related occupation.

An additional factor to consider in assessing needs for training, however, concerns time since EAOS. Forty-one percent of the AT IRRs in the sample were away from active duty for more than 3 years (see table D-1-6). Subject matter experts who review the data provided here may determine that skill upgrade training is required because of technical changes (e.g., new equipment, materials, procedures) in the field.

VALIDATION OF DATA

Our analyses indicate that the need for training of AT IRRs against mobilization requirements is not great. It would appear that required proficiency (i.e., the level shown by current job incumbents) can for the most part be achieved by familiarization training under direct corrective supervision in quite short time periods for most job tasks. There are no indications that comprehensive retraining for all rating tasks, such as would be provided in a formal school setting (e.g., "A" school), is needed. At worst case, instructional modules for training prospective AT returnees on given individual tasks may be required. Information not readily available to the project staff is needed, however, for firm decisions about the need for training to bring prospective IRR returnees to an acceptable level of proficiency or to maintain their skills at a defined level. We recommend that the information provided by this report be evaluated/validated against a number of other considerations. Resource sponsors would be appropriate to validate training needs.

Data Review

As noted previously, the conclusions generated by the project staff are considered tentative and subject to verification. Generalizations from the data have also been limited because of the small numbers of questionnaires returned and because of suspected IRR data base inadequacies. It is believed, however, that much useful information can be gleaned from the descriptive summaries provided. Most of this information has not previously been available because of the many difficulties inherent in conducting skill deterioration research and restrictions on methods that can be used because of practical considerations. Maximum exploitation of the information that is now available is in order. A complete and accurate assessment of the meaning and action implications of the data should be made by individuals who are thoroughly knowledgeable of technical requirements of the AT rating. The NAVTRASYSCEN, if requested, could assist SMEs in this effort. Areas to be considered in the review/validation process are discussed next.

Review Areas

For our study, SMEs from the Aviation Electronics Technician School, Naval Air Station, Memphis, TN, identified the job tasks they thought would be appropriate for returning IRR AT members to perform. Other SMEs may not agree on the list. Resource sponsors should determine if these are indeed the job tasks that an IRR returnee (at mobilization) should be able to perform. Further, a companion decision is required concerning the acceptability of the reported level of competency. Since active duty personnel report that they, on the average, now perform at these levels, these data reflect criterion performance. Resource sponsors should consider whether less proficiency would be acceptable. If so, attendant training requirements for IRRs with concomittant resource requirements would be lessened. On judging the need for training, task criticality, in terms of personnel or equipment safety as it interacts with recent changes to material, procedures, or equipment, must also be considered.

An additional decision factor concerns plans for utilization of IRR personnel at mobilization. If these individuals will serve as casualty replacements, then a fairly high level of proficiency at recall is desirable. Training, as determined by the study data and by the resource sponsor, should occur prior to recall. If, however, IRR members will replace current active duty personnel in less demanding assignments, then time would be available for receiving units or some especially chartered intermediate activity to provide needed training. Likely, the bulk of this training could be done either on the job or in on-the-job type conditions where IRR returnees could demonstrate their ability to perform job tasks under close, corrective supervision. It is our belief, based on available data that desired proficiency would be achieved relatively quickly on most tasks. Further, while decisions must still be made concerning formal training, either institutional or via OJT, our belief is that this type of training can be limited.

Finally, based on (1) the IRR members' reports of their current relatively high residual levels of proficiency and (2) literature findings that maximum skill loss occurs after about 1 year of nonuse of skills, it appears that skill maintenance training for ATs is not strictly necessary. Again, however, this conclusion must be weighed against planned utilization of recalled IRR members. For example, a casualty replacement scenario would make maintenance training more desirable than other scenarios.

CONCLUSIONS

1. Mobilization planners should be aware that the size of the AT IRR manpower pool may be smaller than believed. Approximately 9 to 10 percent of the pool may not be contactable by mail. An additional segment of unknown size may have already reenlisted and/or not be useful to the Navy for other reasons. A substantial percentage of ATs listed in IRR files could also be beyond the zone of involuntary recall.

2. AT IRR personnel who work in civilian occupations related to their rating reported less deterioration of skills than ATs who are not similarly employed. This group should be considered for first recall priority.

3. Comprehensive retraining and maintenance training for IRR ATs appear to be unnecessary to support mobilization. Familiarization training at recall consisting of supervised practice may suffice. This conclusion is subject to concurrence by subject matter expert ATs.

4. AT personnel off active duty for greater than 3 years may require training on selected tasks to update skills despite their reported continuing high proficiency levels.

5. Of the 18 AT job tasks for which skill deterioration was assessed, indications are that none will require any concerted training for returning skills to an acceptable level of proficiency prior to mobilization recall.

6. For all AT IRRs, mean values of current proficiency reported compare favorably with those reported by active duty personnel. This finding also suggests minimal needs for retraining.

RECOMMENDATIONS

1. Review, update, and validate the IRR data base content to assure that accurate assessments of the size of the IRR manpower pool are available at all times. Take whatever other steps are necessary and available to assure continuous updating of the data base.

2. Amend existing procedures where possible to obtain information from IRR members concerning civilian employment. At the very least, obtain this information from those eligible for or receiving bonuses for continued IRR service. Consider these individuals as first choice for mobilization recall.

3. Request resource sponsors review the data of this study. Determine if agreement can be reached that the tasks generated by schoolhouse SMEs adequately represent the AT-3 job. Determine that the AT-3 job is, in fact, acceptable as the target performance level for training to support mobilization. Request resource sponsors consider the data of this study against factors such as changes to materials, procedures, equipment used by the rating, criticality of task performance, and mobilization plans for IRR personnel.

4. Consider recalling a sample of AT IRRs to assess their knowledge of current AT-3 job requirements. Use this information to validate the data and conclusions of this study.

APPENDIX D

ANNEX 2

BUILDER (BU): SKILL DETERIORATION DURING NAVY INDIVIDUAL READY RESERVE (IRR) MEMBERSHIP

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INTRODUCTION

Following a first-tour of active duty, Naval personnel who do not elect other reserve options are assigned to the Individual Ready Reserve (IRR) to complete a specified Military Service Obligation (MSO); other personnel may voluntarily enlist in the IRR. IRR members, typically in a nonpay, nondrill status, are subject to recall to active duty if mobilization of the Armed Forces is ordered. A major concern of mobilization planners is that the skills acquired on active duty may deteriorate over time under the IRR condition of nonuse. This raises the question of the contribution that can be made by recalled IRR service members. To determine the extent and nature of skill deterioration during IRR membership, the Naval Training Systems Center (NAVTRASYSCEN), Code 10, conducted an assessment study. The study was performed at the request of the Chief of Naval Operations (OP-01R1).

This study assessed skill deterioration for 16 critical Navy ratings identified by OP-01. The designation "critical" was based on the criterion of projected personnel shortfalls for mobilization. The Builder (BU) rating was one of these 16.

PURPOSE OF THE STUDY

The purpose of the study was to assess skill deterioration during IRR membership and determine needs for training IRR personnel to restore, upgrade, or maintain their skills at minimum proficiency levels to support mobilization. Implicit in the tasking was the additional requirement to define minimum, or acceptable, proficiency.

In a general sense, acceptable proficiency refers to the ability of a recalled ready reservist to make an effective contribution to a receiving unit's mission. In a more specific sense, it refers to ability to perform a defined set of job tasks at a defined level of competency. Performance proficiency information was essential to establish a baseline around which obtained skill deterioration information could be assessed and to define the terminal performance goals that any proposed training regimen should attempt to achieve.

APPROACH

Complete details of the technical approach to the study are presented in the main body of this report. A brief description is presented here.

Mail-out questionnaires were used to obtain information. Four senior enlisted BUs, assigned to the Naval Construction Center, Gulfport, MS, served as subject matter experts (SME) for questionnaire development. Under guidance given by the project staff, the BU SMEs selected from various source materials a set of job tasks that, in their judgment, best represented the job (non-NEC specific) of an active duty BU-3. This level was chosen in the belief that a recalled ready reservist who could perform job tasks competently at the E-4 level would make a positive work contribution to a receiving unit.

The BU-3 job task statements were used on questionnaires mailed to IRR and active duty personnel. Information sought concerned tasks performed and the level of competency attached to the performance of each. Level of competency was defined in terms of the amount of supervision needed to perform specific job tasks.

Questionnaires mailed to IRR personnel requested information about proficiency on each job task at the End of Active Obligated Service (EAOS) and at the present time (NOW). The difference between proficiency at EAOS and current proficiency would reflect skill deterioration during IRR membership.

Questionnaires mailed to active duty BU-3s requested information about current proficiency on job tasks and proficiency expected after 2 years of nonperformance of the job tasks. The current proficiency estimates were needed to define criterion job performance for an active duty BU-3. The data reflecting what is currently done on the job would define an acceptable level of performance. These data could be used as a baseline for judging amount and consequences of IRR skill deterioration. They also set an upper limit on the proficiency levels that training must achieve to maintain at or restore skills to acceptable levels. Copies of these data collection instruments are shown in the next section.

As of 25 September 1984, 459 BUs were listed in Naval Military Personnel Command (NAVMILPERSCOM) computer files as assigned to the IRR. Names and addresses were obtained from NAVMILPERSCOM through the Naval Reserve Personnel Center (NAVRESPERSCEN). Questionnaires were mailed on 22 October 1984 under CNO (OP-11) cover letter to a random sample of 350 (76 percent). Because of a low initial return rate, a follow-up mailing (351) was made on 29 January 1985. Questionnaire returns were accepted until 28 February 1985.

Coordination with Commander in Chief, U.S. Atlantic Fleet (CINCLANTFLT), Commander in Chief, U.S. Pacific Fleet (CINCPACFLT), and within CNO (OP-01) was accomplished for authorization to survey active duty BU-3 personnel. A BU-3 roster, current as of 2 August 1985, was obtained from NAVMILPERSCOM. From a pool of 546, a sample of 292 BU-3s was determined using accepted survey research methods. Questionnaires were mailed on 18 September 1985 under CNO (OP-11) cover letter to unit/activity commanding officers for distribution to BU-3s named. Returns were accepted until 31 December 1985. Returned questionnaires were scanned to determine data usability, and data were entered into computer files. Subsequently, summaries of the information of interest to the study were prepared.

RESULTS

Results pertinent to the assessment of BU skill deterioration are presented in this section.

QUESTIONNAIRE RETURN STATISTICS

Table D-2-1 shows, for both the IRR and active duty BUs, the number of questionnaires mailed and number and percent of usable returns. For the IRR

sample, the number/percent of nonvalid returns (nonvalid principally because of data base errors) is also shown. Percent usable returns was derived by dividing the number returned (126) by the number delivered (i.e., 350 - 54 = 296).

Table D-2-1

Questionnaire Return Statistics

Sample	No. Mailed	Usable Returns No.	Usable Returns %	Nonvalid No.	Nonvalid %
IRR	350	126	43	54	15
Active Duty	292	163	56		

QUESTIONNAIRE DATA SUMMARIES

Summaries of data obtained from the questionnaires are presented in table D-2-2 for IRR personnel and in table D-2-3 for active duty personnel. The tables are modified questionnaire forms.

Background Questions

Of 121 IRR BUs answering the question, 85 (approximately 70 percent) reported that they now work in a civilian occupation related to their Navy BU rating. Answers to the remaining two background questions for IRRs (see table D-2-2) are not reported since it was determined that the answers might be redundant and could not be unambiguously interpreted. Of the active duty respondents answering the background questions (see table D-2-3), 144 of 158 (91 percent) work in rating. One hundred and three (66 percent) are assigned shore duty.

Task Performance Data

The data summary tables (D-2-2 and D-2-3) show the number (F) and percent (%) of respondents reporting that they had never performed particular job tasks (i.e., they responded to the task description with a "1.") For IRRs, these data refer to the "at EAOS" answers and for active duty to the current (NOW) level of ability. A rank-order correlation (see Siegel, 1956) computed between the two sets of data ($\underline{r}_s = .862$, $p < .05$) indicated significant agreement between the two classes of respondents. Thus, tasks which have not been performed frequently by active duty BUs (to date) are the same tasks that had not been performed frequently by IRRs at EAOS.

Tables D-2-2 and D-2-3 also show, for each task listed on a questionnaire, mean values for performance proficiency/competency, the

Table D-2-2

Overall Summary of BU IRR Questionnaire Data

PART 1:

1. If necessary, correct your Service Number.
2. Is the work which you do **NOW** related to your **Navy** rating?
   Yes 85 No 36
3. Have you done **PREVIOUS** work which is related to your **Navy** rating since your **Expiration** of Active Obligated Service (EAOS)?
   Yes - No -
4. Have you received training related to your **Navy** rating since your **Expiration** of Active Obligated Service (EAOS)?
   Yes - No -

ANSWER KEY:

(1) Have never performed the task.

(2) Can/could do simple parts of the task (need direct supervision).

(3) Can/could do most parts of the task (need general supervision).

(4) Can/could do all parts of the task (need only occasional supervision. Meets minimum local speed and accuracy standards.)

(5) Can/could do complete task quickly and accurately (need no supervision).

PART 2:

For each job task statement below:

A. Indicate your **CURRENT** level of ability according to the answer key above.

B. Estimate your **PREVIOUS** level of ability at the time of your EAOS according to the answer key above.

"(1)" Choices				A			B		
F	%		Tasks	N	Mean	SD	N	Mean	SD
7	6.0	1.	Read and work from shop drawings and sketches.	123	4.33	.928	117	3.89	1.216
13	11.1	2.	Cut, bend, place, and tie reinforcing steel.	123	3.72	1.314	117	3.43	1.348
10	8.7	3.	Erect form members, set screens, strip forms, and shore excavations	122	4.01	1.168	115	3.81	1.317
		4.	Perform layout and cut, fit and install the following:						
15	12.9		a. Asphalt and vinyl floor coverings	122	4.24	1.143	116	3.91	1.368
11	9.4		b. Sheetrock and plywood wall coverings.	123	4.56	.951	117	4.27	1.255
10	8.5		c. Door and window trim baseboards, and moldings.	123	4.50	.995	117	4.15	1.270
10	8.7		d. Plywood, sheetrock and suspended ceilings.	121	4.49	.976	115	4.11	1.269

Table D-2-2 (Continued)

10	8.5	5.	Mix, place, finish, and cure concrete.	122	4.20	1.042	117	3.93	1.271
20	17.1	6.	Construct masonry structures.	123	3.48	1.295	117	3.15	1.410
9	7.8	7.	Construct light wood frame structures including operation of trailer-mounted radial arm field saw.	122	4.39	1.025	115	4.13	1.239
18	15.4	8.	Have knowledge of timber structures (bridges, towers, heavier structures).	123	3.04	1.308	117	2.96	1.228
23	19.7	9.	Have knowledge of advanced base structures and preservative applications against decay (creosote, penetravent, etc.).	123	3.13	1.396	117	2.89	1.357
17	14.5	10.	Mix mortar/stucco by hand or gas-driven portable mixer.	123	4.02	1.270	117	3.72	1.417
20	17.2	11.	Erect metal buildings.	122	3.49	1.248	116	3.27	1.321
18	17.0	12.	Knowledge of/apply knowledge to built-up materials.	112	3.60	1.188	106	3.22	1.324
		13.	Operate and perform prestart checks and operator's maintenance on:						
22	19.3		a. Diesel/gas driven air compressors.	120	3.45	1.454	114	3.36	1.470
19	17.1		b. Diesel/gas driven portable generators.	117	3.58	1.452	111	3.48	1.495
23	20.5		c. Water pumps.	118	3.42	1.493	112	3.30	1.511
9	7.9		d. Vehicles.	121	4.05	1.277	114	3.94	1.326
13	11.4	14.	Erect prefabricated scaffolding and common types of metal scaffolding.	122	4.33	1.117	114	4.09	1.334
21	18.4	15.	Use and care for wire rope and fiber line.	121	3.28	1.416	114	3.18	1.416
		16.	Familiar with:						
16	13.9		a. Areas of rectangles, polygons, and circles.	120	3.62	1.427	115	3.48	1.477
14	12.0		b. Volume of cubes and cylinders.	122	3.71	1.364	117	3.50	1.448
7	6.0		c. Board feet.	122	4.23	1.112	116	3.98	1.258
13	11.7		d. U.S. weights and measures and the metric system.	118	3.77	1.297	111	3.56	1.340
10	8.7	17.	Maintain and repair wood, masonry, and metal structures.	120	4.29	1.095	115	4.03	1.239
		18.	Perform as a crewmember on:						
53	45.3		a. a rapid runway repair crew (SATS).	122	2.65	1.542	117	2.50	1.535
45	34.4		b. a logging and sawmill crew.	122	2.74	1.509	117	2.51	1.460
48	41.7		c. a piledriving crew.	120	2.52	1.384	115	2.40	1.401
53	45.7		d. a wakefront construction crew (piledriving, cofferdams, casements).	122	2.43	1.396	116	2.30	1.409
			Overall Mean:		3.76				

Table D-2-3

Overall Summary of BU Active Duty Questionnaire Data

PART 1:

1. If necessary, correct your Service Number.
2. Does your current billet require you to work in your Navy rating?
   Yes 144 No 14
3. What type duty is your current billet?
   Sea 54 Shore 103

ANSWER KEY:

(1) Have never performed the task.

(2) Can/could do simple parts of the task (need direct supervision).

(3) Can/could do most parts of the task (need general supervision).

(4) Can/could do all parts of the task (need only occasional supervision. Meets minimum local speed and accuracy standards.)

(5) Can/could do complete task quickly and accurately (need no supervision).

PART 2:

For each job task statement below:

A. Use the answer key above to indicate your CURRENT level of ability.

B. Use the answer key above to estimate your EXPECTED level of ability after 2 years of not performing these tasks.

"(1)" Choices			A			B		
F	%	Tasks	N	Mean	SD	N	Mean	SD
2	1.2	1. Read and work from shop drawings and sketches.	162	4.00	.899	153	3.67	.973
13	8.0	2. Cut, bend, place, and tie reinforcing steel.	163	3.80	1.213	154	3.52	1.238
5	3.1	3. Erect form members, set screens, strip forms, and shore excavations	161	4.00	1.031	151	3.57	1.146
		4. Perform layout and cut, fit and install the following:						
9	5.5	a. Asphalt and vinyl floor coverings	163	4.09	1.110	153	3.83	1.152
3	1.8	b. Sheetrock and plywood wall coverings.	163	4.55	.802	153	4.22	.947
2	1.2	c. Door and window trim baseboards, and moldings.	163	4.36	.823	153	4.05	1.028
3	1.0	d. Plywood, sheetrock and suspended ceilings.	162	4.29	.930	152	4.00	1.016

Table D-2-3 (Continued)

3	1.8	5. Mix, place, finish, and cure concrete.	163	4.38	.890	153	3.99	1.082
7	4.3	6. Construct masonry structures.	163	3.61	1.021	152	3.19	1.132
12	7.4	7. Construct light wood frame structures including operation of trailer-mounted radial arm field saw.	163	3.82	1.149	154	3.56	1.215
36	22.4	8. Have knowledge of timber structures (bridges, towers, heavier structures).	161	2.65	1.200	155	2.47	1.130
31	19.3	9. Have knowledge of advanced base structures and preservative applications against decay (creosote, penetravent, etc.).	161	2.85	1.248	153	2.63	1.197
5	3.1	10. Mix mortar/stucco by hand or gas-driven portable mixer.	162	4.21	.987	153	3.86	1.136
24	15.0	11. Erect metal buildings.	160	3.12	1.270	154	2.93	1.237
20	12.6	12. Knowledge of/apply knowledge to built-up materials.	159	2.97	1.139	149	2.71	1.141
		13. Operate and perform prestart checks and operator's maintenance on:						
18	11.0	a. Diesel/gas driven air compressors.	163	3.66	1.320	155	3.41	1.323
13	8.0	b. Diesel/gas driven portable generators.	162	3.70	1.286	154	3.42	1.322
37	22.8	c. Water pumps.	162	3.28	1.541	154	3.14	1.504
3	1.9	d. Vehicles.	162	4.43	.944	152	4.19	1.108
2	1.2	14. Erect prefabricated scaffolding and common types of metal scaffolding.	162	4.44	.877	155	4.19	1.012
40	24.8	15. Use and care for wire rope and fiber line.	161	2.92	1.401	153	2.79	1.331
		16. Familiar with:						
9	5.6	a. Areas of rectangles, polygons, and circles.	162	3.51	1.133	155	3.18	1.261
9	5.5	b. Volume of cubes and cylinders.	161	3.52	1.173	156	3.17	1.256
2	1.2	c. Board feet.	163	4.30	.904	154	3.92	1.094
8	4.9	d. U.S. weights and measures and the metric system.	163	3.44	1.117	154	3.12	1.184
7	4.3	17. Maintain and repair wood, masonry, and metal structures.	161	4.12	.876	153	3.78	1.026
		18. Perform as a crewmember on:						
78	48.4	a. a rapid runway repair crew (SATS).	161	2.34	1.504	153	2.18	1.325
83	51.6	b. a logging and sawmill crew.	161	2.20	1.409	153	2.20	1.372
96	60.0	c. a piledriving crew.	160	1.81	1.141	152	1.82	1.124
108	67.1	d. a wakefront construction crew (piledriving, cofferdams, casements).	161	1.63	1.017	153	1.72	1.085

standard deviation (SD) around the mean, and the number of cases (n) on which a mean is based. For the IRR sample, table D-2-2, the "A" column reflects current average ability level; the "B" column, EAOS average ability level. For the active duty sample (table D-2-3), the "A" column refers to current (NOW) ability and the "B" to proficiency expected after 2 years of nonperformance of a task.[1] A Pearson Product Moment Correlation ($r = .959$, $p < .05$) computed between task means for IRR EAOS and active duty NOW (current proficiency) values indicates that the IRR members, while on active duty, performed job tasks at competency levels equivalent to those of current job incumbents.

For the IRR group, an overall grand mean for current proficiency was computed over all tasks for the rating. This single number indicates that considering the BU-3 job in its entirety (as reflected by the tasks used) the average BU IRR member feels that he could now perform tasks of the rating at a level where only occasional supervision would be needed (mean = 3.8).

For the active duty group, means reflecting proficiency on each job task for BUs working/not working in their rating were computed. These are shown in table D-2-4. Again, the expected-after-2-years data are provided for information only.

SKILL DETERIORATION

Table D-2-5 displays task proficiency means for two subgroups of the BU IRR respondents: (1) those who answered that they were now working, "W," in a field related to the Navy BU rating and (2) those who indicated that they were not working in a related field ("N"). Both EAOS and NOW (current) proficiency means are given. These means, as well as those in table D-2-4, were computed from choices of 2, 3, 4, or 5 from the answer key. These choices place proficiency along a continuum from "Need direct supervision" through "Need no supervision."

As mentioned earlier, skill deterioration is reflected by differences between EAOS proficiency and NOW proficiency. In table D-2-5, values preceded by a minus sign represent a decrease in proficiency during IRR membership: current proficiency is less than EAOS proficiency. Values with no signs indicate increases in proficiency.

The table shows that BUs who now work ("W") in a field related to their former active duty jobs gained proficiency on 28 of the 30 job tasks. The "N" subgroup lost proficiency on 19 of the 30 tasks and had small gains on the other 11. Statistical tests (t tests for independent means; see Guilford and Fruchter, 1973) indicated that over all tasks of the rating, proficiency of the two subgroups was equivalent at EAOS ($t = 1.16$, $p < .252$). Task mean proficiency values, however, differed significantly ($t = 2.97$, $p < .002$) for current (NOW) proficiency.

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[1] These expected-after-2-years proficiency values were not used in subsequent analyses, however, since it was clear that many respondents did not understand the question being asked.

Table D-2-4

Task Mean Values for Two Subgroups of Active Duty BUs

	Not Working ("N")[1]		Working ("W")[2]	
Task	NOW	EXP	NOW	EXP
1	4.231	3.643	4.028	3.714
2	4.417	3.538	4.023	3.738
3	4.308	3.692	4.072	3.701
4A	4.273	3.917	4.268	3.977
4B	4.429	4.308	4.631	4.278
4C	4.143	4.077	4.423	4.098
4D	4.286	4.077	4.350	4.023
5	4.231	3.923	4.465	4.083
6	4.000	3.615	3.686	3.294
7	4.143	4.000	4.023	3.693
8	3.600	3.182	3.100	2.860
9	3.455	3.333	3.289	3.000
10	4.286	4.231	4.297	3.916
11	3.727	3.417	3.583	3.241
12	3.500	3.636	3.218	2.895
13A	4.071	3.923	3.984	3.648
13B	4.143	4.000	3.908	3.610
13C	4.214	4.154	3.925	3.607
13D	4.500	4.500	4.479	4.242
14	4.429	4.000	4.489	4.252
15	3.800	3.500	3.519	3.264
16A	3.643	3.308	3.642	3.387
16B	3.714	3.308	3.654	3.357
16C	4.214	3.714	4.345	3.985
16D	3.643	3.538	3.551	3.298
17	4.286	4.000	4.099	3.778
18A	3.875	3.625	3.592	3.013
18B	4.000	3.714	3.403	3.219
18C	3.800	3.143	3.000	2.814
18D	3.600	3.333	2.870	2.774

Composite Mean:	Group W	NOW	3.864
		EXP	3.559
	Group N	NOW	4.032
		EXP	3.745
Overall Mean:		NOW	3.948
		EXP	3.652

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[1] n = 14

[2] n = 144

Table D-2-5

Task Mean Values for Two Subgroups of IRR BUs

	Not Working ("N")[1]		Working ("W")[2]		Mean Difference	
Task	NOW	EAOS	NOW	EAOS	"N"	"W"
1	3.886	3.933	4.553	4.128	-0.047	0.425
2	3.313	3.379	4.200	3.877	-0.066	0.323
3	3.545	3.862	4.313	4.135	-0.317	0.178
4A	4.000	4.269	4.518	4.370	-0.269	0.148
4B	4.531	4.643	4.786	4.592	-0.112	0.194
4C	4.469	4.536	4.714	4.416	-0.067	0.298
4D	4.375	4.519	4.699	4.368	-0.144	0.331
5	4.000	4.276	4.381	4.171	-0.276	0.210
6	3.484	3.385	3.810	3.652	0.099	0.158
7	4.147	4.367	4.659	4.405	-0.220	0.254
8	2.963	3.069	3.560	3.397	-0.106	0.163
9	3.080	3.000	3.675	3.443	0.080	0.232
10	4.121	4.222	4.275	4.155	-0.101	0.120
11	3.667	3.720	3.790	3.739	-0.053	0.051
12	3.533	3.680	3.917	3.656	-0.147	0.261
13A	3.750	3.875	4.000	3.939	-0.125	0.061
13B	3.680	3.917	4.137	4.015	-0.237	0.122
13C	3.667	3.810	3.945	3.909	-0.143	0.036
13D	4.400	4.310	4.262	4.149	0.090	0.113
14	4.323	4.480	4.598	4.473	-0.157	0.125
15	3.393	3.522	3.781	3.706	-0.129	0.075
16A	3.885	3.957	3.962	3.824	-0.072	0.138
16B	3.903	3.778	3.949	3.824	0.125	0.125
16C	4.323	4.069	4.369	4.192	0.254	0.177
16D	4.310	3.893	3.987	3.884	0.417	0.103
17	4.258	4.241	4.500	4.338	0.017	0.162
18A	3.684	3.625	3.788	3.783	0.059	0.005
18B	3.250	3.091	3.800	3.592	0.159	0.208
18C	2.947	2.938	3.491	3.520	0.009	-0.029
18D	2.944	2.929	3.473	3.500	0.015	-0.027

Composite Mean:	Group W	NOW	4.130
		EOS	3.972
	Group N	NOW	3.794
		EOS	3.843
Overall Mean:		NOW	3.962
		EOS	3.907

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[1] n = 36

[2] n = 85

TIME IN IRR

Table D-2-6 provides a breakdown of BU personnel by time spent in the IRR prior to mail out of the questionnaires. The table also shows mean values assigned for proficiency for 6-month intervals of IRR time, and for IRRs off active duty more than 3 years. These mean values are shown for information only, since the number of individuals in most time groups is too small to permit meaningful quantitative interpretation.

Table D-2-6

Mean Proficiency Values for BU IRR Respondents by Time Since EAOS

Time (Mos.) Since EAOS	Mean	No. of Cases
0-5	3.45	23
6-11	3.48	4
12-17	3.73	2
18-23	3.69	1
24-35	3.76	1
36+	3.99	55
Overall Mean	3.80	86*

*EAOS dates were not contained on the NAVMILPERSCOM data file for a large number of IRR BUs. Consequently, time since EAOS could not be determined.

COMMENTS AND OBSERVATIONS

Comments and observations on the data are offered here. As warranted, interpretations are made and discussed. These interpretations provide the basis for certain conclusions about skill deterioration and retraining needs. Our conclusions are based on best available data. However, they are subject to validation. The low questionnaire return rates coupled with the uncertain quality of the IRR data base (discussed below) require cautious inferences and limit generalizations. Nevertheless, the results do provide much useful information about the IRR that has not been available previously. They also suggest directions that should be taken with respect to the management and utilization of the IRR resource.

COMMENTS ON DATA BASE

Approximately 15 percent of questionnaires returned were classified as "nonvalid" (table D-2-1). This category reflects probable errors in the IRR data base. The nonvalid category included, most prominently, questionnaires returned by the Postal Service as undeliverable (bad addresses). It also included, but to a much smaller extent, questionnaires returned by respondents with comments such as: "No longer in IRR, returned to active duty, already received final discharge. Retiree recruited from another service, was never on active duty in the Navy." (All information concerning such cases was transmitted to the Naval Reserve Personnel Center on 26 September 1985). Finally, a very few questionnaires were returned by individuals who refused to provide information and, some, by relatives marked, "Deceased." From the above data, it can be concluded that about 15 percent of the BU IRRs could not or would not be available for a mobilization call.

Questionnaires were presumably delivered by the Postal Service to a number of BUs (57 percent) from whom no information was received. It is likely that many did not respond for reasons such as those cited above--they felt the questionnaire was not applicable. A further group, of unknown size, then would also be unavailable for mobilization because they are not in the viable IRR manpower pool as is currently believed. These considerations prompt a recommendation for review and validation of the BU IRR roster.

Another data base issue that should be examined concerns the amount of time that BU respondents have been away from active duty. This information is given in table D-2-6. Sixty-four percent were in the IRR for more than 3 years. Two issues emerge: (1) the need for skill upgrading and (2) availability of IRR members. Upgrade training because of new equipment, procedures, or material may be required for this group despite their beliefs (table D-2-6) in their continuing ability to perform job tasks at an acceptable level.

A second consideration concerns the military service obligation (MSO). Those who are liable for a 6- or 8-year MSO (depending on when they entered on active duty) may be involuntarily recalled. Those who are beyond the MSO may only be recalled under existing agreements. If these agreements do not exist, still fewer individuals may be actually recallable for mobilization. The size of the available IRR manpower pool may be overestimated. Again, the recommendation is made that this data base be reviewed and validated if this is not already occurring.

SKILL DETERIORATION

Information directly pertinent to the question of skill deterioration was presented in table D-2-5. In table D-2-5, differences between mean values at EAOS and NOW (current proficiency) are shown. Values preceded by a minus sign represent skill deterioration potentially attributable to time spent in the IRR.

Approximately 70 percent of BU IRRs reported that they now work in a civilian occupation related to their BU rating and the effects of this work experience on skill deterioration will be considered next. As table D-2-5 shows, BUs who now work, "W," in a field related to their Navy rating gained proficiency on 28 of 30 job tasks. The "N" subgroup lost proficiency on 19 job tasks and reported small gains on the other 11. Taken over all tasks, differences between the current (NOW) proficiency means for the two subgroups were statistically significant. Also, they could not be attributed to initial differences between the groups at EAOS. Thus, civilian BU-related employment significantly affected skill deterioration. Those continuing to work in the field after EAOS reported insignificant deterioration and a high amount of proficiency increase. The tasks on which skill deterioration occurred are easily identifiable from table D-2-5.

TRAINING NEEDS

While skill deterioration information is of interest in its own right, the more important concern of this study is with determining the need for training IRR personnel prior to a mobilization recall. Thus, the implications of skill deterioration data must be assessed against the criterion of acceptable level of proficiency. This can be done most directly by comparing the current proficiency levels reported by BU IRRs against the levels reported by active duty BU-3s. The task means for the active duty sample can be taken as E-4 criterion performance since they reflect the level of proficiency claimed by the average BU-3 now on active duty.

The meaning of specific numerical values reported for task means must be clearly understood before conclusions about skill deterioration or training needs can be addressed. Attention is directed to the "answer key" shown on either table D-2-2 or D-2-3. The answer key shows that a value of "4," for example, represents skilled performance with only a need for occasional supervision. Following conventional practice, we assume that a "4" is reflected by any values between 3.50 and 4.49. A "3" is interpreted similarly. Skill deterioration may be shown by lower mean values for NOW (i.e., current) versus EAOS proficiency. However, the change from EAOS scores may not be sufficient to move the IRR respondents to a lower proficiency category. Skill loss occurred on tasks 3 and 5, for example, for the IRRs not working in a related field. However, the losses reported resulted in the IRRs remaining in the "4" category (see table D-2-5). We would conclude that the deterioration is of no consequence insofar as signaling a need for retraining.

Assessment of the need for training IRR personnel to support mobilization should proceed with the application of similar logic. Table D-2-7 below presents the task mean values reported for current proficiency by IRR personnel who are not working in a field related to the BU rating and also for those who are working in a related field. These values are from table D-2-5. Task proficiency means for active duty personnel working in their rating (taken from table D-2-4) are also shown in table D-2-7. Inspection of the data shows that only one value, marked with an asterisk in the table, deviates markedly from the active duty norm. Hence, from these data alone, a fair conclusion is that training of BU IRRs would not be required before mobilization to bring proficiency to an acceptable level.

Table D-2-7

Task Mean Proficiency Values for IRR and Active Duty BUs

	IRR		Active Duty
Tasks	Not in Field	In Field	In Rating
1	3.9	4.6	4.0
2	3.3*	4.2	4.0
3	3.5	4.3	4.1
4a	4.0	4.5	4.3
4b	4.5	4.8	4.6
4c	4.5	4.7	4.4
4d	4.4	4.7	4.4
5	4.0	4.4	4.5
6	3.5	3.8	3.7
7	4.1	4.7	4.0
8	3.0	3.6	3.1
9	3.1	3.7	3.3
10	4.1	4.3	4.3
11	3.7	3.8	3.6
12	3.5	3.9	3.2
13a	3.8	4.0	4.0
13b	3.7	4.1	3.9
13c	3.7	3.9	3.9
13d	4.4	4.3	4.5
14	4.3	4.6	4.5
15	3.4	3.8	3.5
16a	3.9	4.0	3.6
16b	3.9	3.9	3.7
16c	4.3	4.4	4.3
16d	4.3	4.0	3.6
17	4.3	4.5	4.1
18a	3.7	3.8	3.6
18b	3.3	3.8	3.4
18c	2.9	3.5	3.0
18d	2.9	3.5	2.9

*Probable training need.

From our assessment, the current level of proficiency of BU IRRs on all but the one job task noted is probably adequate. There seems to be no need for extensive retraining or maintenance training prior to mobilization. The average IRR BU should be able to perform most of the required job tasks at an appropriate level of competency with a modicum of refamiliarization at mobilization. For the most part, this could probably be given by close, corrective supervision while the returnee is performing job tasks. This conclusion pertains to all BUs but is probably especially relevant to the 70 percent of IRR BUs who continue to work in a BU-related occupation.

An additional factor to consider in assessing needs for training, however, concerns time since EAOS. Sixty-four percent of the BU IRRs were away from active duty for more than 3 years (see table D-2-6). Subject matter experts who review the data provided here may determine that skill upgrade training is required because of technical changes (e.g., new equipment, materials, procedures) in the field.

VALIDATION OF DATA

Our analyses indicate that the need for training of BU IRRs against mobilization requirements is not great. It would appear that required proficiency (i.e., the level shown by current job incumbents) can for the most part be achieved by familiarization training under direct corrective supervision in quite short time periods for most job tasks. There are no indications that comprehensive training for all rating tasks, such as would be provided in a formal school setting (e.g., "A" School), is needed. Information not readily available to the project staff is needed, however, for firm decisions about the need for training to bring prospective IRR returnees to an acceptable level of proficiency or to maintain their skills at a defined level. We recommend that the information provided by this report be evaluated/validated against a number of other considerations. Resource sponsors would be appropriate to validate training needs.

Data Review

As noted previously, the conclusions generated by the project staff are considered tentative and subject to verification. Generalizations from the data are limited because of the small numbers of questionnaires returned and because of suspected IRR data base inadequacies. It is believed, however, that much useful information can be gleaned from the descriptive summaries provided. Most of this information has not previously been available because of the many difficulties inherent in conducting skill deterioration research, and restrictions on methods that can be used because of practical considerations. Maximum exploitation of the information that is now available is in order. A complete and accurate assessment of the meaning and action implications of the data should be made by individuals who are thoroughly knowledgeable of technical requirements of the BU rating. The NAVTRASYSCEN, if requested, could assist SMEs in this effort. Areas to be considered in the review/validation process are discussed next.

Review Areas

For our study, SMEs from the Naval Construction Center, Gulfport, MS, identified the job tasks they thought would be appropriate for returning IRR BU members to perform. Other SMEs may not agree on the list. Resource sponsors should determine if these are the job tasks that an IRR returnee (at mobilization) should be able to perform. Further, a companion decision is required concerning the acceptability of the reported level of competency. Since active duty personnel report that they, on the average, now perform at these levels, these data reflect E-4 criterion performance. Resource sponsors should consider whether less proficiency would be acceptable. If so, attendant training requirements for IRRs with concomittant resource requirements would be lessened. On judging the need for training, task criticality, in terms of personnel or equipment safety as it interacts with recent changes to material, procedures, or equipment, must also be considered.

An additional decision factor concerns plans for utilization of IRR personnel at mobilization. If these individuals will serve as casualty replacements, then a fairly high level of proficiency at recall is desirable. Training, as determined by the study data and by the resource sponsor, should occur prior to recall. If, however, IRR members will replace current active duty personnel in less demanding assignments, then time would be available for receiving units or some especially chartered intermediate activity to provide needed training. Likely, the bulk of this training could be done either on the job or in on-the-job type conditions where IRR returnees could demonstrate their ability to perform job tasks under close, corrective supervision. It is our belief, based on available data that desired proficiency would be achieved relatively quickly on most tasks. Further, while decisions must still be made concerning formal training, either institutional or via OJT, our belief is that this type of training can be limited.

Finally, based on (1) the IRR members' reports of their current relatively high residual levels of proficiency and (2) literature findings that maximum skill loss occurs after about 1 year of nonuse of skills, it appears that skill maintenance training for BUs is not strictly necessary. Again, however, this conclusion must be weighed against planned utilization of recalled IRR members. For example, a casualty replacement scenario would make maintenance training more desirable than other scenarios.

CONCLUSIONS

1. Mobilization planners should be aware that the size of the BU IRR manpower pool may be smaller than believed. Approximately 15 percent of the pool may not be contactable by mail. An additional segment of unknown size may have already reenlisted and/or not be useful to the Navy for other reasons. A substantial percentage of BUs listed in IRR files could also be beyond the zone of involuntary recall.

2. BU IRR personnel who work in civilian occupations related to their rating reported no significant deterioration of skills. Rather, this subgroup gained proficiency on 28 of 30 job tasks. Consequently, this subgroup should be considered for first recall priority.

3. Retraining and maintenance training for IRR BUs appear to be unnecessary to support mobilization. Familiarization training at recall consisting of supervised practice may suffice. This conclusion is subject to concurrence by subject matter expert BUs.

4. BU personnel off active duty for greater than 3 years may require training on selected tasks to update skills if there have been substantial changes in building techniques despite their reported continuing high proficiency levels. Basic building skills probably do not require retraining.

5. Of the 30 BU job tasks for which skill deterioration was assessed, indications are that none will require any concerted training for returning skills to an acceptable level of proficiency prior to mobilization recall.

6. For all BU IRRs, mean values of current proficiency reported compare favorably with those reported by active duty personnel. This finding also suggests minimal needs for retraining.

RECOMMENDATIONS

1. Review, update, and validate the IRR data base content to assure that accurate assessments of the size of the IRR manpower pool are available at all times. Take whatever other steps are necessary and available to assure continuous updating of the data base.

2. Amend existing procedures where possible to obtain information from IRR members concerning civilian employment. At the very least, obtain this information from those eligible for or receiving bonuses for continued IRR service. Consider these individuals as first choice for mobilization recall.

3. Request resource sponsors review the data of this study. Determine if agreement can be reached that the tasks generated by schoolhouse SMEs adequately represent the BU-3 job. Determine that the BU-3 job is, in fact, acceptable as the target performance level for training to support mobilization. Request resource sponsors consider the data of this study against factors such as changes to materials, procedures, equipment used by the rating, criticality of task performance, and mobilization plans for IRR personnel.

4. Consider recalling a sample of BU IRRs to assess their knowledge of current BU-3 job requirements. Use this information to validate the data and conclusions of this study.

APPENDIX D

ANNEX 3

CRYPTOLOGIC TECHNICIAN (ADMINISTRATION) (CTA): SKILL DETERIORATION DURING NAVY INDIVIDUAL READY RESERVE (IRR) MEMBERSHIP

INTRODUCTION

Following a first-tour of active duty, Naval personnel who do not elect other reserve options are assigned to the Individual Ready Reserve (IRR) to complete a specified Military Service Obligation (MSO); other personnel may voluntarily enlist in the IRR. IRR members, typically in a nonpay, nondrill status, are subject to recall to active duty if mobilization of the Armed Forces is ordered. A major concern of mobilization planners is that the skills acquired on active duty may deteriorate over time under the IRR condition of nonuse. This raises the question of the contribution that can be made by recalled IRR service members. To determine the extent and nature of skill deterioration during IRR membership, the Naval Training Systems Center (NAVTRASYSCEN), Code 10, conducted an assessment study. The study was performed at the request of the Chief of Naval Operations (OP-01R1).

This study assessed skill deterioration for 16 critical Navy ratings identified by OP-01. The designation "critical" was based on the criterion of projected personnel shortfalls for mobilization. The Cryptologic Technician (Administration) (CTA) rating was one of these 16.

PURPOSE OF THE STUDY

The purpose of the study was to assess skill deterioration during IRR membership and determine needs for training IRR personnel to restore, upgrade, or maintain their skills at minimum proficiency levels to support mobilization. Implicit in the tasking was the additional requirement to define minimum acceptable proficiency.

In a general sense, acceptable proficiency refers to the ability of a recalled ready reservist to make an effective contribution to a receiving unit's mission. In a more specific sense, it refers to ability to perform a defined set of job tasks at a defined level of competency. Performance proficiency information was essential to establish a baseline around which obtained skill deterioration information could be assessed and to define the terminal performance goals that any proposed training regimen should attempt to achieve.

APPROACH

Complete details of the technical approach to the study are presented in the main body of this report. A brief description is presented here.

Mail-out questionnaires were used to obtain information. Five senior enlisted CTAs, assigned to the Naval Technical Training Center, Corry Station, Pensacola, FL, served as subject matter experts (SME) for questionnaire development. Under guidance given by the project staff, the CTA SMEs selected from various source materials a set of job tasks that, in their judgment, best represented the job (non-NEC specific) of an active duty CTA-3. This level was chosen in the belief that a recalled ready reservist who could perform CTA job tasks competently at the E-4 level would make a positive work contribution to a receiving unit.

The CTA-3 job task statements were used on questionnaires mailed to IRR and active duty personnel. Information sought concerned tasks performed and the level of competency attached to the performance of each. Level of competency was defined in terms of the amount of supervision needed to perform specific job tasks.

Questionnaires mailed to IRR personnel requested information about proficiency on each job task at the End of Active Obligated Service (EAOS) and at the present time (NOW). The difference between proficiency at EAOS and current proficiency would reflect skill deterioration during IRR membership.

Questionnaires mailed to active duty CTA-3s requested information about current proficiency on job tasks and proficiency expected after 2 years of nonperformance of the job tasks. The current proficiency estimates were needed to define criterion job performance for an active duty CTA-3. The data reflecting what is currently done on the job would define an acceptable level of performance. These data could be used as a baseline for judging amount and consequences of IRR skill deterioration. They also set an upper limit on the proficiency levels that training must achieve to maintain at or restore skills to acceptable levels. Copies of these data collection instruments are shown in the next section.

As of 10 December 1984, 328 CTAs were listed in Naval Military Personnel Command (NAVMILPERSCOM) computer files as assigned to the IRR. Names and addresses were obtained from NAVMILPERSCOM through the Naval Reserve Personnel Center (NAVRESPERSCEN). Questionnaires were mailed on 8 February 1985 under CNO (OP-11) cover letter to a random sample of 222 (67.7 percent). Coordination with the Commander, Naval Security Group (COMNAVSECGRU) had previously been accomplished. Because of a low initial return rate, a follow-up mailing (136) was made on 8 April 1985. Questionnaire returns were accepted until 24 May 1985.

Coordination with Commander in Chief, U.S. Atlantic Fleet (CINCLANTFLT), Commander in Chief, U.S. Pacific Fleet (CINCPACFLT), COMNAVSECGRU, and within CNO (OP-01) was accomplished for authorization to survey active duty CTA-3 personnel. A CTA-3 roster, current as of 2 August 1985, was obtained from NAVMILPERSCOM. From a pool of 191, a sample of 159 CTA-3s was determined using accepted survey research methods. Questionnaires were mailed on 18 September 1985 under CNO (OP-11) cover letter to unit/activity commanding officers for distribution to CTA-3s named. Returns were accepted until 31 December 1985. Returned questionnaires were scanned to determine data usability, and data were entered into computer files. Subsequently, summaries of the information of interest to the study were prepared.

RESULTS

Results pertinent to the assessment of CTA skill deterioration are presented in this section.

QUESTIONNAIRE RETURN STATISTICS

Table D-3-1 shows, for both the IRR and active duty CTAs, the number of questionnaires mailed and number and percent of usable returns. For the IRR sample, the number/percent of nonvalid returns (nonvalid principally because of data base errors) is also shown. Percent usable returns was derived by dividing the number returned (50) by the number delivered (i.e., 222 - 71 = 151).

Table D-3-1

Questionnaire Return Statistics

Sample	No. Mailed	Usable Returns No.	Usable Returns %	Nonvalid No.	Nonvalid %
IRR	222	50	33	71	32
Active Duty	159	117	74		

QUESTIONNAIRE DATA SUMMARIES

Summaries of data obtained from the questionnaires are presented in table D-3-2 for IRR personnel and in table D-3-3 for active duty personnel. The tables are modified questionnaire forms.

Background Questions

Of 49 IRR CTAs answering the question, 11 (approximately 22 percent) reported that they now work in a civilian occupation related to their Navy CTA rating. Answers to the remaining two background questions for IRRs (see table D-3-2) are not reported since it was determined that the answers might be redundant and could not be unambiguously interpreted. Of the active duty respondents answering the background questions (see table D-3-3), 99 of 114 (86.8 percent) work in rating. One hundred and six (94 percent) are assigned sea duty.

Task Performance Data

The data summary tables (D-3-2 and D-3-3) show the number (F) and percent (%) of respondents reporting that they had never performed particular job tasks (i.e., they responded to the task description with a "1.") For IRRs, these data refer to the "at EAOS" answers and for active duty to the current (NOW) level of ability. A rank-order correlation (see Siegel, 1956) computed between the two sets of data ($\underline{r_s} = .924$, $p < .05$) indicated significant agreement between the two classes of respondents. Thus, tasks which have not been performed by active duty CTAs (to date) are the same tasks that had not been performed by IRRs at EAOS.

Table D-3-2

Overall Summary of CTA IRR Questionnaire Data

PART 1:

1. If necessary, correct your Service Number.
2. Is the work which you do NOW related to your Navy rating?
   Yes 11 No 38
3. Have you done PREVIOUS work which is related to your Navy rating since your Expiration of Active Obligated Service (EAOS)?
   Yes - No -
4. Have you received training related to your Navy rating since your Expiration of Active Obligated Service (EAOS)?
   Yes - No -

ANSWER KEY:

(1) Have never performed the task.

(2) Can/could do simple parts of the task (need direct supervision).

(3) Can/could do most parts of the task (need general supervision).

(4) Can/could do all parts of the task (need only occasional supervision. Meets minimum local speed and accuracy standards.)

(5) Can/could do complete task quickly and accurately (need no supervision).

PART 2:

For each job task statement below:

A. Indicate your CURRENT level of ability according to the answer key above.

B. Estimate your PREVIOUS level of ability at the time of your EAOS according to the answer key above.

"(1)" Choices				A			B		
F	%		Tasks	N	Mean	SD	N	Mean	SD
-	-	1.	Type messages, correspondence, directives, and operational records and reports according to current directives.	49	3.49	1.227	50	4.68	.683
1	2.0	2.	Perform filing clerk duties.	49	4.02	1.331	50	4.66	.872
-	-	3.	Operate office equipment.	49	4.16	1.179	50	4.80	.639
1	2.0	4.	Use and interpret publications pertaining to personnel security and general administration.	49	3.82	1.219	50	4.54	.813
1	2.0	5.	Enter changes to update publications pertaining to personnel, security, and general administration.	48	4.02	1.246	49	4.65	.830
1	2.0	6.	Account for, handle, stow, transmit, protect and destroy classified material (all types including SI).	48	3.52	1.337	50	4.50	.863

Table D-3-2 (Continued)

7	14.6	7. Perform SSO administration functions.	46	3.00	1.535	48	3.88	1.424
2	4.0	8. Perform official and registered mail yeoman duties; prepare material for Armed Forces Courier Service transmittal.	49	3.55	1.355	50	4.42	1.032
19	38.0	9. Operate and understand the capabilities of word processing equipment.	49	3.08	1.644	50	3.04	1.761
		10. I can/could type.	43	58wpm	78.439	46	64wpm	52.714
		Overall Mean:		3.62				

Table D-3-3

Overall Summary of CTA Active Duty Questionnaire Data

PART 1:

1. If necessary, correct your Service Number.
2. Does your current billet require you to work in your Navy rating?
   Yes 99 No 15
3. What type duty is your current billet?
   Sea 106 Shore 7

ANSWER KEY:

(1) Have never performed the task.

(2) Can/could do simple parts of the task (need direct supervision).

(3) Can/could do most parts of the task (need general supervision).

(4) Can/could do all parts of the task (need only occasional supervision. Meets minimum local speed and accuracy standards.)

(5) Can/could do complete task quickly and accurately (need no supervision).

PART 2:

For each job task statement below:

A. Use the answer key above to indicate your CURRENT level of ability.

B. Use the answer key above to estimate your EXPECTED level of ability after 2 years of not performing these tasks.

"(1)" Choices				A			B		
F	%		Tasks	N	Mean	SD	N	Mean	SD
2	1.7	1.	Type messages, correspondence, directives, and operational records and reports according to current directives.	117	4.16	.830	110	3.54	.955
2	1.7	2.	Perform filing clerk duties.	116	4.67	.755	110	4.40	.941
2	1.7	3.	Operate office equipment.	116	4.60	.844	110	4.15	1.012
9	7.8	4.	Use and interpret publications pertaining to personnel security and general administration.	116	3.86	1.156	110	3.52	1.163
5	4.3	5.	Enter changes to update publications pertaining to personnel, security, and general administration.	116	4.40	1.087	110	4.06	1.065
5	4.4	6.	Account for, handle, stow, transmit, protect and destroy classified material (all types including SI).	114	4.12	1.074	108	3.54	1.147

Table D-3-3 (Continued)

42	36.2	7.	Perform SSO administration functions.	116	2.75	1.520	113	2.51	1.289
15	12.9	8.	Perform official and registered mail yeoman duties; prepare material for Armed Forces Courier Service transmittal.	116	3.85	1.381	112	3.39	1.283
19	16.4	9.	Operate and understand the capabilities of word processing equipment.	116	3.62	1.449	110	3.31	1.347
		10.	I can/could type.						

Tables D-3-2 and D-3-3 also show, for each task listed on a questionnaire, mean values for performance proficiency/competency, the standard deviation (SD) around the mean, and the number of cases (n) on which a mean is based. For the IRR sample, table D-3-2, the "A" column reflects current average ability level; the "B" column, EAOS average ability level. For the active duty sample (table D-3-3), the "A" column refers to current (NOW) ability and the "B" to proficiency expected after 2 years of nonperformance of a task.[1] A Pearson Product Moment Correlation ($r = .57$, $p > .05$) computed between task means for IRR EAOS and active duty NOW (current proficiency) values indicates that the IRR members, while on active duty, did not perform job tasks at competency levels equivalent to those of current job incumbents.

For the IRR group, an overall grand mean for current proficiency was computed over all tasks for the rating. This single number indicates that considering the CTA-3 job in its entirety (as reflected by the tasks used) the average IRR member feels that he could now perform tasks of the rating at a level where only occasional supervision would be needed (mean = 3.62).

For the active duty group, means reflecting proficiency on each job task for CTAs working/not working in their rating were computed. These are shown in table D-3-4. Again, the expected-after-2-years data are provided for information only.

SKILL DETERIORATION

Table D-3-5 displays task proficiency means for two subgroups of the CTA IRR respondents: (1) those who answered that they were now working ("W") in a field related to the Navy CTA rating and (2) those who indicated that they were not working ("N") in a related field. Both EAOS and NOW (current) proficiency means are given. These means, as well as those in table D-3-4, were computed from choices of 2, 3, 4, or 5 from the answer key. These choices place proficiency along a continuum from "Need direct supervision" through "Need no supervision."

As mentioned earlier, skill deterioration is reflected by differences between EAOS proficiency and NOW proficiency. In table D-3-5, values preceded by a minus sign represent a decrease in proficiency during IRR membership: current proficiency is less than EAOS proficiency. Values with no signs indicate increases in proficiency.

The table shows that CTAs who now work ("W") in a field related to their former active duty jobs gained proficiency on two of the nine job tasks. This group also reported less skill deterioration over the other rating tasks than the "N" subgroup. Statistical tests (t tests for independent means; see Guilford and Fruchter, 1973) indicated that over all tasks of the CTA rating the proficiency of the two subgroups was equivalent at EAOS ($t = 1.66$, $p < .0582$). Task mean proficiency values differed significantly ($t = 5.98$, $p < .0000096$) on current (NOW) proficiency.

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[1] These expected-after-2-years proficiency values were not used in subsequent analyses, however, since it was clear that many respondents did not understand the question being asked.

Table D-3-4

Task Mean Values for Two Subgroups of Active Duty CTAs

	Not Working ("N")[1]		Working ("W")[2]	
Task	NOW	EXP	NOW	EXP
1	4.000	3.692	4.253	3.576
2	4.571	4.231	4.794	4.560
3	4.643	3.857	4.680	4.231
4	3.909	3.417	4.106	3.697
5	4.077	3.615	4.642	4.196
6	3.727	3.200	4.326	3.698
7	4.000	3.222	3.742	3.197
8	4.300	3.538	4.273	3.711
9	3.583	3.357	4.205	3.718

Composite Mean:	Group W	NOW	4.336
		EXP	3.843
	Group N	NOW	4.090
		EXP	3.570
Overall Mean:		NOW	4.213
		EXP	2.809

[1] n = 15

[2] n = 99

Table D-3-5

Task Mean Values for Two Subgroups of IRR CTAs

Task	Not Working ("N")[1] NOW	EAOS	Working ("W")[2] NOW	EAOS	Mean Difference "N"	"W"
1	3.529	4.641	4.273	4.818	-1.112	-0.545
2	4.088	4.684	4.909	4.909	-0.596	0.000
3	4.139	4.769	4.818	4.909	-0.630	-0.091
4	3.886	4.632	4.364	4.545	-0.746	-0.181
5	4.057	4.737	4.800	4.700	-0.680	0.100
6	3.529	4.526	4.500	4.727	-0.997	-0.227
7	3.542	4.333	4.100	4.455	-0.791	-0.355
8	3.500	4.486	4.636	4.818	-0.986	-0.182
9	3.870	4.227	4.600	4.444	-0.357	0.156

Composite Mean:	Group W	NOW	4.556
		EOS	4.703
	Group N	NOW	3.793
		EOS	4.559
Overall Mean:		NOW	4.174
		EOS	3.393

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[1] n = 38

[2] n = 11

TIME IN IRR

Table D-3-6 provides a breakdown of CTA personnel by time spent in the IRR prior to mail out of the questionnaires. The table also shows mean values assigned for proficiency for 6-month intervals of IRR time, and for IRRs off active duty more than 3 years. These mean values are shown for information only, since the number of individuals in each group is too small to permit meaningful quantitative interpretation.

Table D-3-6

Mean Proficiency Values for CTA IRR Respondents by Time Since EAOS

Time (Mos.) Since EAOS	Mean	No. of Cases
0-5	3.22	3
6-11	-	-
12-17	3.22	1
18-23	-	-
24-35	4.22	2
36+	3.63	40
Overall Mean	3.62	46

COMMENTS AND OBSERVATIONS

Comments and observations on the data are offered here. As warranted, interpretations are made and discussed. These interpretations provide the basis for certain conclusions about skill deterioration and retraining needs. Our conclusions are based on best available data. However, they are subject to validation. The low questionnaire return rate coupled with the uncertain quality of the IRR data base (discussed below) require cautious inferences and limit generalizations. Nevertheless, the results do provide much useful information about the IRR that has not been available previously. They also suggest directions that should be taken with respect to the management and utilization of the IRR resource.

COMMENTS ON DATA BASE

Approximately 32 percent of questionnaires returned were classified as "nonvalid" (table D-3-1). This category reflects probable errors in the IRR data base. The nonvalid category included, most prominently, questionnaires returned by the Postal Service as undeliverable (bad addresses). It also included, but to a much smaller extent, questionnaires returned by respondents with comments such as: "No longer in IRR, returned to active duty, already received final discharge. Retiree recruited from another service, was never on active duty in the Navy." (All information concerning such cases was transmitted to the Naval Reserve Personnel Center on 26 September 1985.) Finally, a very few questionnaires were returned by individuals who refused to provide information and, some, by relatives marked, "Deceased." From the above data, it can be concluded that about one-third of the CTA IRRs could not or would not be available for mobilization.

Questionnaires were presumably delivered by the Postal Service to a number of CTAs (67 percent) from whom no information was received. It is likely that many did not respond for reasons such as those cited above--they felt the questionnaire was not applicable. A further group, of unknown size, then would also be unavailable for mobilization because they are not in the viable IRR manpower pool as is currently believed. These considerations prompt a recommendation for review and validation of the CTA IRR roster.

Another data base issue that should be examined concerns the amount of time that CTA respondents have been away from active duty. This information is given in table D-3-6. Eighty-seven percent were in the IRR for more than 3 years. Two issues emerge: (1) the need for skill upgrading and (2) availability of IRR members. Upgrade training because of new equipment, procedures, or material may be required for this group, despite their beliefs (table D-3-6) in their continuing ability to perform job tasks at an acceptable level. CTA SMEs must make this determination, however, based on changes to how the job is now performed.

A second consideration concerns the military service obligation (MSO). Those who are liable for a 6- or 8-year MSO (depending on when they entered on active duty) may be involuntarily recalled. Those who are beyond the MSO may only be recalled under existing agreements. If these agreements do not exist, still fewer individuals may be actually recallable for mobilization. The size of the available IRR manpower pool may be overestimated. Again, the recommendation is made that this data base be reviewed and validated if this is not already occurring. Further, an attempt should be made to determine why so few CTAs were in the IRR group separated less than 3 years.

SKILL DETERIORATION

Information directly pertinent to the question of skill deterioration was presented in table D-3-5. In table D-3-5, differences between mean values at EAOS and NOW (current proficiency) are shown. Values preceded by a minus sign represent skill deterioration potentially attributable to time spent in the IRR.

Approximately 22 percent of CTA IRRs reported that they now work in a civilian occupation related to the CTA rating and the effects of this work experience on skill deterioration will be considered next. As table D-3-5 shows, CTAs who now work in a field related to their Navy rating gained proficiency on two job tasks. The "W" subgroup also reported less skill deterioration for the other CTA job tasks than the "N" subgroup. Taken over all tasks, differences between the current (NOW) proficiency means for the two subgroups were statistically significant. Also, they could not be attributed to initial differences between the groups at EAOS. Thus, civilian CTA-related employment significantly affected skill deterioration. Those continuing to work in the CTA field after EAOS reported less deterioration. The tasks on which the greatest amount of skill deterioration occurred are easily identifiable from table D-3-5.

TRAINING NEEDS

While skill deterioration information is of interest in its own right, the more important concern of this study is with determining the need for training IRR personnel prior to a mobilization recall. Thus, the implications of skill deterioration data must be assessed against the criterion of acceptable level of proficiency. This can be done most directly by comparing the current proficiency levels reported by CTA IRRs against the levels reported by active duty CTA-3s. The task means for the active duty sample can be taken as E-4 criterion performance since they reflect the level of proficiency claimed by the average CTA-3 now on active duty.

The meaning of specific numerical values reported for task means must be clearly understood before conclusions about skill deterioration or training needs can be addressed. Attention is directed to the "answer key" shown on either table D-3-2 or D-3-3. The answer key shows that a value of "4," for example, represents skilled performance with only a need for occasional supervision. Following conventional practice, we assume that a "4" is reflected by any values between 3.50 and 4.49. A "3" is interpreted similarly. Skill deterioration may be shown by lower mean values for NOW (i.e., current) versus EAOS proficiency. However, the change from EAOS scores may not be sufficient to move the IRR respondents to a lower proficiency category. For example, skill loss on tasks 6 to 8 occurred for the IRRs working in a related field. However, the losses reported resulted in the IRRs remaining in the "4" category (see table D-3-5). We would conclude that the deterioration is of no consequence insofar as signaling a need for retraining.

Assessment of the need for training IRR personnel to support mobilization should proceed with the application of similar logic. Table D-3-7 below presents the task mean values reported for current proficiency by IRR personnel who are not working in a field related to the CTA rating and also for those who are working in a related field. These values are from table D-3-5. Task proficiency means for active duty personnel working in their rating (taken from table D-3-4) are also shown in table D-3-7. Inspection of the data shows that all values are essentially "4"s. Hence, from these data alone, a fair conclusion is that training of CTA IRRs would not be required before mobilization to bring proficiency to an acceptable level.

Table D-3-7

Task Mean Proficiency Values for IRR and Active Duty CTAs

	IRR		Active Duty
Tasks	Not in Field	In Field	In Rating
1	3.5	4.3	4.3
2	4.1	4.9	4.8
3	4.1	4.8	4.7
4	3.9	4.4	4.1
5	4.1	4.8	4.6
6	3.5	4.5	4.3
7	3.5	4.1	3.7
8	3.5	4.6	4.3
9	3.9	4.6	4.2

From our assessment, the current level of proficiency of CTA IRRs on all job tasks is probably adequate. There seems to be no need for extensive retraining or maintenance training of CTAs prior to mobilization. The average IRR CTA should be able to perform required job tasks at an appropriate level of competency with a modicum of refamiliarization at mobilization. For the most part, this could probably be given by close, corrective supervision while the returnee is performing job tasks. This conclusion pertains to all CTAs but is probably especially relevant to the 22 percent of IRR CTAs who continue to work in an CTA-related occupation. Skill deterioration over all tasks of the rating was minimal.

An additional factor to consider in assessing needs for training, however, concerns time since EAOS. Eighty-seven percent of the CTA IRRs in the sample were away from active duty for more than 3 years (see table D-3-6). Subject matter experts who review the data provided here may determine that skill upgrade training is required because of technical changes (e.g., new equipment, materials, procedures) in the field.

VALIDATION OF DATA

Our analyses indicate that the need for training of CTA IRRs against mobilization requirements is not great. It would appear that required proficiency (i.e., the level shown by current job incumbents) can for the most part be achieved by familiarization training under direct corrective supervision in quite short time periods for most job tasks. There are no indications that comprehensive retraining for all rating tasks, such as would be provided in a formal school setting (e.g., "A" school), is needed. At worst case, instructional modules for training prospective CTA returnees on given individual tasks may be required. Information not readily available to the project staff is needed, however, for firm decisions about the need for training to bring prospective IRR returnees to an acceptable level of proficiency or to maintain their skills at a defined level. We recommend that the information provided by this report be evaluated/validated against a number of other considerations. Resource sponsors would be appropriate to validate training needs.

Data Review

As noted previously, the conclusions generated by the project staff are considered tentative and subject to verification. Generalizations from the data have also been limited because of the small numbers of questionnaires returned and because of suspected IRR data base inadequacies. It is believed, however, that much useful information can be gleaned from the descriptive summaries provided. Most of this information has not previously been available because of the many difficulties inherent in conducting skill deterioration research and restrictions on methods that can be used because of practical considerations. Maximum exploitation of the information that is now available is in order. A complete and accurate assessment of the meaning and action implications of the data should be made by individuals who are thoroughly knowledgeable of technical requirements of the CTA rating. The NAVTRASYSCEN, if requested, could assist SMEs in this effort. Areas to be considered in the review/validation process are discussed next.

Review Areas

For our study, SMEs from the Naval Technical Training Center, Corry Station, Pensacola, FL, identified the job tasks they thought would be appropriate for returning IRR CTA members to perform. Other SMEs may not agree on the list. Resource sponsors should determine if these are the job tasks that an IRR returnee (at mobilization) should be able to perform. Further, a companion decision is required concerning the acceptability of the reported level of competency. Since active duty personnel report that they, on the average, now perform at these levels, these data reflect E-4 criterion performance. Resource sponsors should consider whether less proficiency would be acceptable. If so, attendant training requirements for IRRs with concomittant resource requirements would be lessened. On judging the need for training, task criticality, in terms of personnel or equipment safety as it interacts with recent changes to material, procedures, or equipment, must also be considered.

An additional decision factor concerns plans for utilization of IRR personnel at mobilization. If these individuals will serve as casualty replacements, then a fairly high level of proficiency at recall is desirable. Training, as determined by the study data and by the resource sponsor, should occur prior to recall. If, however, IRR members will replace current active duty personnel in less demanding assignments, then time would be available for receiving units or some especially chartered intermediate activity to provide needed training. Likely, the bulk of this training could be done either on the job or in on-the-job type conditions where IRR returnees could demonstrate their ability to perform job tasks under close, corrective supervision. It is our belief, based on available data that desired proficiency would be achieved relatively quickly on most tasks. Further, while decisions must still be made concerning formal training, either institutional or via OJT, our belief is that this type of training can be limited.

Finally, based on (1) the IRR members' reports of their current relatively high residual levels of proficiency and (2) literature findings that maximum skill loss occurs after about 1 year of nonuse of skills, it appears that skill maintenance training for CTAs is not strictly necessary. Again, however, this conclusion must be weighed against planned utilization of recalled IRR members. For example, a casualty replacement scenario would make maintenance training more desirable than other scenarios.

CONCLUSIONS

1. Mobilization planners should be aware that the size of the CTA IRR manpower pool may be smaller than believed. Approximately 33 percent of the pool may not be contactable by mail. An additional segment of unknown size may have already reenlisted and/or not be useful to the Navy for other reasons. A substantial percentage of CTAs listed in IRR files could also be beyond the zone of involuntary recall.

2. CTA IRR personnel who work in civilian occupations related to their CTA rating reported less deterioration of skills than CTAs who are not similarly employed. This subgroup should be considered for first recall priority.

3. Retraining and maintenance training for IRR CTAs is apparently not necessary to support mobilization. Familiarization training at recall consisting of supervised practice may suffice. This conclusion is subject to concurrence by subject matter expert CTAs.

4. CTA personnel off active duty for more than 3 years may require training on selected tasks to update skills because of changes in equipment, procedures, or material despite their reported continuing high proficiency levels.

5. Of the 9 CTA job tasks for which skill deterioration was assessed, indications are that none will require any concerted training for returning skills to an acceptable level of proficiency prior to mobilization recall.

6. For all CTA IRRs, mean values of current proficiency reported compare favorably with those reported by active duty personnel. This finding also suggests minimal needs for retraining.

RECOMMENDATIONS

1. Review, update, and validate the IRR data base content to assure that accurate assessments of the size of the IRR manpower pool are available at all times. Take whatever other steps are necessary and available to assure continuous updating of the data base.

2. Amend existing procedures where possible to obtain information from IRR members concerning civilian employment. At the very least, obtain this information from those eligible for or receiving bonuses for continued IRR service. Consider these individuals as first choice for mobilization recall.

3. Request resource sponsors review the data of this study. Determine if agreement can be reached that the tasks generated by schoolhouse SMEs adequately represent the CTA-3 job. Determine that the CTA-3 job is, in fact, acceptable as the target performance level for training to support mobilization. Request resource sponsors consider the data of this study against factors such as changes to materials, procedures, equipment used by the rating, criticality of task performance, and mobilization plans for IRR personnel.

4. Consider recalling a sample of CTA IRRs to assess their knowledge of current CTA-3 job requirements. Use this information to validate the data and conclusions of this study.

APPENDIX D

ANNEX 4

CRYPTOLOGIC TECHNICIAN (INTERPRETIVE) (CTI): SKILL DETERIORATION DURING NAVY INDIVIDUAL READY RESERVE (IRR) MEMBERSHIP

INTRODUCTION

Following a first-tour of active duty, Naval personnel who do not elect other reserve options are assigned to the Individual Ready Reserve (IRR) to complete a specified Military Service Obligation (MSO). Other personnel may voluntarily enlist in the IRR. IRR members, typically in a nonpay, nondrill status, are subject to recall to active duty if mobilization of the Armed Forces is ordered. A major concern of mobilization planners is that the skills acquired on active duty may deteriorate over time under the IRR condition of nonuse. This raises the question of the contribution that can be made by recalled IRR service members. To determine the extent and nature of skill deterioration during IRR membership, the Naval Training Systems Center (NAVTRASYSCEN), Code 10, conducted an assessment study. The study was performed at the request of the Chief of Naval Operations (OP-01R1).

This study assessed skill deterioration for 16 critical Navy ratings identified by OP-01. The designation "critical" was based on the criterion of projected personnel shortfalls for mobilization. The Cryptologic Technician (Interpretive) (CTI) rating was one of these 16.

PURPOSE OF THE STUDY

The purpose of the study was to assess skill deterioration during IRR membership and determine needs for training IRR personnel to restore, upgrade, or maintain their skills at minimum proficiency levels tosupport mobilization. Implicit in the tasking was the additional requirement to define minimum acceptable proficiency.

In a general sense, acceptable proficiency refers to the ability of a recalled ready reservist to make an effective contribution to a receiving unit's mission. In a more specific sense, it refers to ability to perform a defined set of job tasks at a defined level of competency. Performance proficiency information was essential to establish a baseline around which obtained skill deterioration information could be assessed and to define the terminal performance goals that any proposed training regimen should attempt to achieve.

APPROACH

Complete details of the technical approach to the study are presented in the main body of this report. A brief description is presented here.

Mail-out questionnaires were used to obtain information. Six senior enlisted CTIs, assigned to the Naval Technical Training Center (Corry Station, Pensacola, FL) Detachment, Goodfellow AFB, San Antonio, TX, served as subject matter experts (SME) for questionnaire development. Under guidance given by the project staff, the CTI SMEs selected from various source materials a set of job tasks that, in their judgment, best represented the job (non-NEC specific) of an active duty CTI-3. This level was chosen in the belief that a recalled ready reservist who could perform CTI job tasks competently at the E-4 level would make a positive work contribution to a receiving unit.

The CTI-3 job task statements were used on questionnaires mailed to IRR and active duty personnel. Information sought concerned tasks performed and the level of competency attached to the performance of each. Level of competency was defined in terms of the amount of supervision needed to perform specific job tasks.

Questionnaires mailed to IRR personnel requested information about proficiency on each job task at the End of Active Obligated Service (EAOS) and at the present time (NOW). The difference between proficiency at EAOS and current proficiency would reflect skill deterioration during IRR membership.

Questionnaires mailed to active duty CTI-3s requested information about current proficiency on job tasks and proficiency expected after 2 years of nonperformance of the job tasks. The current proficiency estimates were needed to define criterion job performance for an active duty CTI-3. The data reflecting what is currently done on the job would define an acceptable level of performance. These data could be used as a baseline for judging amount and consequences of IRR skill deterioration. Copies of the data collection instruments are shown in the next section.

As of 10 December 1984, 484 CTIs were listed in Naval Military Personnel Command (NAVMILPERSCOM) computer files as assigned to the IRR. Names and addresses were obtained from NAVMILPERSCOM through the Naval Reserve Personnel Center (NAVRESPERSCEN). Questionnaires were mailed on 8 February 1985 under CNO (OP-11) cover letter to a random sample of 367 (75 percent). Coordination with the Commander, Naval Security Group (COMNAVSECGRU) had previously been accomplished. Because of a low initial return rate, a follow-up mailing (233) was made on 8 April 1985. Questionnaire returns were accepted until 24 May 1985.

Coordination with Commander in Chief, U.S. Atlantic Fleet (CINCLANTFLT), Commander in Chief, U.S. Pacific Fleet (CINCPACFLT), COMNAVSECGRU, and within CNO (OP-01) was accomplished for authorization to survey active duty CTI-3 personnel. A CTI-3 roster, current as of 2 August 1985, was obtained from NAVMILPERSCOM. From a pool of 181, a sample of 155 CTI-3s was determined using accepted survey research methods. Questionnaires were mailed on 18 September 1985 under CNO (OP-11) cover letter to unit/activity commanding officers for distribution to CTI-3s named. Returns were accepted until 31 December 1985. Returned questionnaires were scanned to determine data usability, and data were entered into computer files. Subsequently, summaries of the information of interest to the study were prepared.

RESULTS

Results pertinent to the assessment of CTI skill deterioration are presented in this section.

QUESTIONNAIRE RETURN STATISTICS

Table D-4-1 shows, for both the IRR and active duty CTIs, the number of questionnaires mailed and number and percent of usable returns. For the IRR

sample, the number/percent of nonvalid returns (nonvalid principally because of data base errors) is also shown. Percent usable returns was derived by dividing the number returned (77) by the number delivered (i.e., 367 - 118 = 249).

Table D-4-1

Questionnaire Return Statistics

Sample	No. Mailed	Usable Returns No.	Usable Returns %	Nonvalid No.	Nonvalid %
IRR	367	77	48	118	32
Active Duty	155	79	51		

QUESTIONNAIRE DATA SUMMARIES

Summaries of data obtained from the questionnaires are presented in table D-4-2 for IRR personnel and in table D-4-3 for active duty personnel. The tables are modified questionnaire forms.

Background Questions

Of 76 IRR CTIs answering the question, 8 (approximately 11 percent) reported that they now work in a civilian occupation related to their Navy CTI rating. Answers to the remaining two background questions for IRRs (see table D-4-2) are not reported since it was determined that the answers might be redundant and could not be unambiguously interpreted. Of the active duty respondents answering the background questions (see table D-4-3), 73 of 78 (93.5 percent) work in rating. Seventy-eight percent are assigned sea duty.

Task Performance Data

The data summary tables (D-4-2 and D-4-3) show the number (F) and percent (%) of respondents reporting that they had never performed particular job tasks (i.e., they responded to the task description with a "1.") For IRRs, these data refer to the "at EAOS" answers and for active duty to the current (NOW) level of ability. A rank-order correlation (see Siegel, 1956) computed between the two sets of data ($\underline{r} = .836$, $p < .05$) indicated significant agreement between the two classes of respondents. Thus, tasks which have not been performed by active duty CTIs (to date) are the same tasks that had not been performed by IRRs at EAOS.

Table D-4-2

Overall Summary of CTI IRR Questionnaire Data

PART 1:

1. If necessary, correct your Service Number.
2. Is the work which you do NOW related to your Navy rating?
   Yes 8 No 68
3. Have you done PREVIOUS work which is related to your Navy rating since your Expiration of Active Obligated Service (EAOS)?
   Yes - No -
4. Have you received training related to your Navy rating since your Expiration of Active Obligated Service (EAOS)?
   Yes - No -

ANSWER KEY:

(1) Have never performed the task.

(2) Can/could do simple parts of the task (need direct supervision).

(3) Can/could do most parts of the task (need general supervision).

(4) Can/could do all parts of the task (need only occasional supervision. Meets minimum local speed and accuracy standards.)

(5) Can/could do complete task quickly and accurately (need no supervision).

PART 2:

For each job task statement below:

A. Indicate your CURRENT level of ability according to the answer key above.

B. Estimate your PREVIOUS level of ability at the time of your EAOS according to the answer key above.

"(1)" Choices				A			B		
F	%		Tasks	N	Mean	SD	N	Mean	SD
6	21.1	1.	Select antennas and transmission lines; identify RF interference.	76	2.47	1.227	76	3.37	1.565
5	6.5	2.	Operate, tune, and calibrate electronic equipment.	77	2.95	1.356	77	3.96	1.251
8	10.5	3.	Operate radiotelephone positions; maintain handlogs.	75	2.99	1.409	76	4.20	1.276
-	-	4.	Recognize, identify, and report significant items of interest.	76	3.40	1.108	76	4.53	.683
-	-	5.	Use technical working aids (e.g., dictionaries).	76	4.22	1.115	77	4.77	.484
37	49.3	6.	Operate word processor.	76	3.16	1.567	75	2.55	1.671
32	42.1	7.	Operate computer based collection systems.	76	2.63	1.522	76	2.70	1.633

Table D-4-2 (Continued)

1	1.3	8.	Transcribe magnetic tape recordings and translate written material.	77	3.03	1.135	77	4.26	.834
4	5.2	9.	Perform basic radio traffic analysis.	77	2.94	1.185	77	4.12	1.112
7	9.1	10.	Identify classes of target ships and aircraft, and their associated weapon systems.	77	2.47	1.071	77	3.78	1.242
4	5.2	11.	Handle, account for, stow, transmit, and destroy classified material.	77	3.36	1.376	77	4.27	1.120
5	6.5	12.	Calculate time conversions.	77	3.62	1.469	77	4.08	1.273
8	10.4	13.	Pass a Foreign Language Aptitude Maintenance (FLAPMA) examination.	76	2.63	1.220	77	3.84	1.319
12	15.6	14.	Prepare for and perform fleet direct support operations.	77	2.51	1.221	77	3.71	1.512
4	5.3	15.	Prepare reports and summaries.	77	3.43	1.361	76	4.17	1.100
5	6.6	16.	Interpret categories of SIGINT Alerts.	75	2.55	1.154	76	3.95	1.188
		17.	I can/could type.	71	39wpm	15.344	73	39wpm	13.219
			Overall Mean:		3.00				

Table D-4-3

Overall Summary of CTI Active Duty Questionnaire Data

PART 1:

1. If necessary, correct your Service Number.
2. Does your current billet require you to work in your Navy rating?
   Yes 73 No 5
3. What type duty is your current billet?
   Sea 60 Shore 17

ANSWER KEY:

(1) Have never performed the task.

(2) Can/could do simple parts of the task (need direct supervision).

(3) Can/could do most parts of the task (need general supervision).

(4) Can/could do all parts of the task (need only occasional supervision. Meets minimum local speed and accuracy standards.)

(5) Can/could do complete task quickly and accurately (need no supervision).

PART 2:

For each job task statement below:

A. Use the answer key above to indicate your CURRENT level of ability.

B. Use the answer key above to estimate your EXPECTED level of ability after 2 years of not performing these tasks.

"(1)" Choices				A			B		
F	%		Tasks	N	Mean	SD	N	Mean	SD
26	32.9	1.	Select antennas and transmission lines; identify RF interference.	79	2.80	1.564	75	2.36	1.270
13	16.5	2.	Operate, tune, and calibrate electronic equipment.	79	3.49	1.484	75	2.79	1.200
6	7.6	3.	Operate radiotelephone positions; maintain handlogs.	79	4.25	1.171	76	3.24	1.106
1	1.3	4.	Recognize, identify, and report significant items of interest.	78	4.32	.830	75	3.32	1.067
1	1.3	5.	Use technical working aids (e.g., dictionaries).	78	4.78	.595	75	4.16	.959
15	19.2	6.	Operate word processor.	78	3.37	1.487	73	2.92	1.289
40	50.6	7.	Operate computer based collection systems.	79	2.41	1.597	74	2.23	1.350

Table D-4-3 (Continued)

2	2.6	8. Transcribe magnetic tape recordings and translate written material.	78	4.14	1.041	76	3.05	1.153
2	2.5	9. Perform basic radio traffic analysis.	79	3.89	1.109	74	2.97	1.134
5	6.3	10. Identify classes of target ships and aircraft, and their associated weapon systems.	79	3.57	1.117	77	2.43	1.044
4	5.1	11. Handle, account for, stow, transmit, and destroy classified material.	79	3.94	1.158	76	3.11	1.173
1	1.3	12. Calculate time conversions.	79	3.94	1.158	76	3.11	1.173
7	9.0	13. Pass a Foreign Language Aptitude Maintenance (FLAPMA) examination.	78	3.68	1.324	75	2.53	1.082
22	28.2	14. Prepare for and perform fleet direct support operations.	78	3.15	1.612	75	2.37	1.271
7	9.0	15. Prepare reports and summaries.	78	3.83	1.221	74	2.92	1.156
13	16.5	16. Interpret categories of SIGINT Alerts.	76	3.30	1.433	72	2.54	1.198
		17. I can/could type.						

Tables D-4-2 and D-4-3 also show, for each task listed on a questionnaire, mean values for performance proficiency/competency, the standard deviation (SD) around the mean, and the number of cases (n) on which a mean is based. For the IRR sample, table D-4-2, the "A" column reflects current average ability level; the "B" column, EAOS average ability level. For the active duty sample (table D-4-3), the "A" column refers to current (NOW) ability and the "B" to proficiency expected after 2 years of nonperformance of a task.[1] A Pearson Product Moment Correlation ($r = .824$, $p < .05$) computed between task means for IRR EAOS and active duty NOW (current proficiency) values indicates that the IRR members, while on active duty, performed job tasks at competency levels equivalent to those of current job incumbents.

For the IRR group, an overall grand mean for current proficiency was computed over all tasks for the rating. This single number indicates that considering the CTI-3 job in its entirety (as reflected by the tasks used) the average IRR member feels that he could now perform most tasks of the rating at a level where general supervision would be needed (mean = 3.0).

For the active duty group, means reflecting proficiency on each job task for CTIs working/not working in their rating were computed. These are shown in table D-4-4. Again, the expected-after-2-years data are provided for information only.

SKILL DETERIORATION

Table D-4-5 displays task proficiency means for two subgroups of the CTI IRR respondents: (1) those who answered that they were now working, "W," in a field related to the Navy CTI rating and (2) those who indicated that they were not working ("N") in a related field. Both EAOS and NOW (current) proficiency means are given. These means, as well as those in table D-4-4, were computed from choices of 2, 3, 4, or 5 from the answer key. These choices place proficiency along a continuum from "Need direct supervision" through "Need no supervision."

As mentioned earlier, skill deterioration is reflected by differences between EAOS proficiency and NOW proficiency. In table D-4-5, values preceded by a minus sign represent a decrease in proficiency during IRR membership: current proficiency is less than EAOS proficiency. Values with no signs would have indicated increases in proficiency.

The table shows that all CTIs lost proficiency on all job tasks. The "W" subgroup reported less skill deterioration than the "N" group for 9 of the 16 job tasks. Statistical tests (t tests for independent means; see Guilford and Fruchter, 1973) indicated that over all tasks of the CTI rating, the two subgroups differed significantly at EAOS ($t = .3.71$, $p < .0004$) and, also, on current (NOW) proficiency ($t = 2.74$, $p < .005$).

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[1] These expected-after-2-years proficiency values were not used in subsequent analyses, however, since it was clear that many respondents did not understand the question being asked.

Table D-4-4

Task Mean Values for Two Subgroups of Active Duty CTIs

	Not Working ("N")[1]		Working ("W")[2]	
Task	NOW	EXP	NOW	EXP
1	1.000	3.000	3.712	2.980
2	3.000	2.500	4.016	3.097
3	3.000	2.333	4.571	3.391
4	3.600	4.250	4.423	3.304
5	4.600	4.200	4.845	4.206
6	3.600	3.400	3.982	3.309
7	4.000	3.000	3.838	3.205
8	3.333	2.667	4.264	3.143
9	3.667	3.000	3.973	3.075
10	3.000	2.500	3.783	2.797
11	3.800	3.750	4.130	3.262
12	4.250	4.000	4.333	3.824
13	3.000	3.500	4.000	2.758
14	2.000	2.000	4.074	3.061
15	4.400	4.000	4.092	3.000
16	4.000	3.333	3.780	2.962

Composite Mean:	Group W	NOW	4.114
		EXP	3.211
	Group N	NOW	3.328
		EXP	3.215
Overall Mean:		NOW	3.721
		EXP	3.213

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[1] n = 5

[2] n = 73

Table D-4-5

Task Mean Values for Two Subgroups of IRR CTIs

	Not Working ("N")[1]		Working ("W")[2]		Mean Difference	
Task	NOW	EAOS	NOW	EAOS	"N"	"W"
1	3.060	3.963	2.800	4.333	-0.903	-1.533
2	3.317	3.421	3.750	4.000	-0.104	-0.250
3	3.421	4.565	3.750	4.667	-1.144	-0.917
4	3.439	4.500	4.000	4.750	-1.061	-0.750
5	4.269	4.754	4.714	4.875	-0.485	-0.161
6	3.840	3.970	4.143	4.600	-0.130	-0.457
7	3.419	3.821	4.333	4.800	-0.402	-0.467
8	3.062	4.279	3.750	4.500	-1.217	-0.750
9	3.048	4.262	3.857	4.500	-1.214	-0.643
10	2.754	3.984	3.167	4.714	-1.230	-1.547
11	3.531	4.409	4.333	4.857	-0.878	-0.524
12	3.937	4.292	3.833	4.286	-0.355	-0.453
13	2.810	4.148	3.375	4.375	-1.338	-1.000
14	2.963	4.169	3.000	4.667	-1.206	-1.667
15	3.581	4.297	4.375	4.750	-0.716	-0.375
16	2.807	4.141	3.600	4.286	-1.334	-0.686

Composite Mean:	Group W	NOW	3.799
		EOS	4.560
	Group N	NOW	3.329
		EOS	4.186
Overall Mean:		NOW	3.564
		EOS	4.373

[1] n = 68

[2] n = 8

TIME IN IRR

Table D-4-6 provides a breakdown of CTI personnel by time spent in the IRR prior to mail out of the questionnaires. The table also shows mean values assigned for proficiency for 6-month intervals of IRR time and for IRRs off active duty more than 3 years. These mean values are shown for information only, since the number of individuals in each group is too small to permit meaningful quantitative interpretation.

Table D-4-6

Mean Proficiency Values for CTI IRR Respondents by Time Since EAOS

Time (Mos.) Since EAOS	Mean	No. of Cases
0-5	3.23	6
6-11	-	-
12-17	4.63	1
18-23	-	-
24-35	3.71	3
36+	2.92	60
Overall Mean	3.00	70

COMMENTS AND OBSERVATIONS

Comments and observations on the data are offered here. As warranted, interpretations are made and discussed. These interpretations provide the basis for certain conclusions about skill deterioration and retraining needs. Our conclusions are based on best available data. However, they are subject to validation. The low questionnaire return rate coupled with the uncertain quality of the IRR data base (discussed below) require cautious inferences and limit generalizations. Nevertheless, the results do provide much useful information about the IRR that has not been available previously. They also suggest directions that should be taken with respect to the management and utilization of the IRR resource.

COMMENTS ON DATA BASE

Approximately 32 percent of questionnaires returned were classified as "nonvalid" (table D-4-1). This category reflects probable errors in the IRR data base. The nonvalid category included, most prominently, questionnaires returned by the Postal Service as undeliverable (bad addresses). It also included, but to a much smaller extent, questionnaires returned by respondents with comments such as: "No longer in IRR, returned to active duty, already received final discharge. Retiree recruited from another service, was never on active duty in the Navy." (All information concerning such cases was transmitted to the Naval Reserve Personnel Center on 26 September 1985.) Finally, a very few questionnaires were returned by individuals who refused to provide information and, some, by relatives marked, "Deceased." From the above data, it can be concluded that about 32 percent of the CTI IRRs could not or would not be available for mobilization.

Questionnaires were presumably delivered by the Postal Service to a number of CTIs (69 percent) from whom no information was received. It is likely that many did not respond for reasons such as those cited above--they felt the questionnaire was not applicable. A further group, of unknown size, then would also be unavailable for mobilization because they are not in the viable IRR manpower pool as is currently believed. These considerations prompt a recommendation for review and validation of the CTI IRR roster.

Another data base issue that should be examined concerns the amount of time that CTI respondents have been away from active duty. This information is given in table D-4-6. Eighty-six percent were in the IRR for more than 3 years. Two issues emerge: (1) the need for skill upgrading and (2) availability of IRR members. Upgrade training because of new equipment, procedures, or material will probably be required for this group. CTI SMEs should make this determination based on changes to how the job is now performed.

A second consideration concerns the military service obligation (MSO). Those who are liable for a 6- or 8-year MSO (depending on when they entered on active duty) may be involuntarily recalled. Those who are beyond the MSO may only be recalled under existing agreements. If these agreements do not exist, still fewer individuals may be actually recallable for mobilization. The size of the available IRR manpower pool may be overestimated. Again, the recommendation is made that this data base be reviewed and validated if this is not already occurring.

SKILL DETERIORATION

Information directly pertinent to the question of skill deterioration was presented in table D-4-5. In table D-4-5, differences between mean values at EAOS and NOW (current proficiency) are shown. Values preceded by a minus sign represent skill deterioration potentially attributable to time spent in the IRR.

Approximately 11 percent of CTI IRRs reported that they now work in a civilian occupation related to the CTI rating and the effects of this work experience on skill deterioration will be considered next. As table D-4-5 shows, CTIs who now work ("W") in a field related to their Navy rating reported less skill deterioration for nine of the CTI job tasks than the "N" subgroup. Taken over all tasks, differences between the current (NOW) proficiency means for the two subgroups were statistically significant. These differences in proficiency also existed between the groups at EAOS, however. Former CTIs who as civilians chose to work in a CTI-related field showed significantly less skill deterioration over all job tasks. But, the differences could have been due to conditions (unknown) that affected their EAOS proficiencies.

The tasks on which the greatest amount of skill deterioration occurred are easily identifiable from table D-4-5.

TRAINING NEEDS

While skill deterioration information is of interest in its own right, the more important concern of this study is with determining the need for training IRR personnel prior to a mobilization recall. Thus, the implications of skill deterioration data must be assessed against the criterion of acceptable level of proficiency. This can be done most directly by comparing the current proficiency levels reported by CTI IRRs against the levels reported by active duty CTI-3s. The task means for the active duty sample can be taken as E-4 criterion performance since they reflect the level of proficiency claimed by the average CTI-3 now on active duty.

The meaning of specific numerical values reported for task means must be clearly understood before conclusions about skill deterioration or training needs can be addressed. Attention is directed to the "answer key" shown on either table D-4-2 or D-4-3. The answer key shows that a value of "4," for example, represents skilled performance with only a need for occasional supervision. Following conventional practice, we assume that a "4" is reflected by any values between 3.50 and 4.49. A "3" is interpreted similarly. Skill deterioration may be shown by lower mean values for NOW (i.e., current) versus EAOS proficiency. However, the change from EAOS scores may not be sufficient to move the IRR respondents to a lower proficiency category. For example, skill loss on tasks 2 to 9 occurred for the IRRs working in a related field. However, the losses reported resulted in the IRRs remaining in the "4" category (see table D-4-5). We would conclude that the deterioration is of no consequence insofar as signaling a need for retraining.

Assessment of the need for training IRR personnel to support mobilization should proceed with the application of similar logic. Table D-4-7 below presents the task mean values reported for current proficiency by IRR personnel who are not working in a field related to the CTI rating and also for those who are working in a related field. These values are from table D-4-5. Task proficiency means for active duty personnel working in their rating (taken from table D-4-4) are also shown in table D-4-7. Inspection of the data shows that 12 of the 16 job tasks are essentially "4"s for IRR CTIs working in a related field. For IRR CTIs not working in a related field only, 5 of the 16 job tasks are "4"s. Hence, from these data alone, a fair conclusion is that training of CTI IRRs working in a related field would not be required on the 12 tasks identified to bring proficiency to an acceptable level before mobilization. On the other hand, considerable training of CTI IRRs not working in a related field would be recommended.

Table D-4-7

Task Mean Proficiency Values for IRR and Active Duty CTIs

	IRR		Active Duty
Tasks	Not in Field	In Field	In Rating
1	3.1*	2.8*	3.7
2	3.3*	3.8	4.0
3	3.4*	3.8	4.6
4	3.4*	4.0	4.4
5	4.3	4.7	4.8
6	3.8	4.1	4.0
7	3.4*	4.3	3.8
8	3.1*	3.8	4.3
9	3.0*	3.9	4.0
10	2.8*	3.2*	3.8
11	3.5	4.3	4.1
12	4.0	3.8	4.3
13	2.8*	3.4*	4.0
14	3.0*	3.0*	4.1
15	3.6	4.4	4.1
16	2.8*	3.6	3.8

*Probable training needs.

From our assessment, there is no apparent need for extensive retraining or maintenance training of CTIs now working in the field. The data indicate that the average IRR CTI in this category should be able to perform required job tasks at an appropriate level of competency with a modicum of refamiliarization at mobilization. The picture is different for CTI IRRs not working in the field. In this case, the average IRR CTI can not be expected to be able to perform required job tasks at mobilization. Due to the nature of the CTI job, tasking should be issued to the appropriate CT community to develop a specialized premobilization curriculum for the rating.

For a number of reasons, even though the data reviewed above might indicate otherwise, we would also recommend formal refresher training for the CTIs who are working in jobs related to their rating. These reasons stem from the intrinsic nature of the CTI job and the limitations of most civilian employment for providing practice opportunities on the many aspects of this job. For those relatively few IRR CTIs who are in civilian jobs related to the rating, training requirements would certainly be less than for the remaining IRRs.

Any premobilization curriculum developed for CTIs should consider the findings of research literature that reacquisition of lost skills requires about one-half the time required to acquire these skills originally. Also, a mobilization curriculum should be flexible enough to accommodate specific training needs of individual CTIs. The tasks identified in table D-4-7 should be appropriately emphasized in the curriculum. Training for both basic and operational skills must be considered.

An additional factor to consider in assessing needs for training concerns time since EAOS. Eighty-six percent of the CTI IRRs in the sample were away from active duty for more than 3 years (see table D-4-6). Subject matter experts who review the data provided here may determine that skill upgrade training is required because of technical changes (e.g., new equipment, materials, procedures) in the field. These needs could also be incorporated into a specialized curriculum.

VALIDATION OF DATA

Our analyses indicate that there is a need for training CTI IRRs to support mobilization. Formal refresher training appears to be the best solution. In some cases, instructional modules for training prospective CTI returnees on given individual tasks may suffice. Information not readily available to the project staff is needed, however, for firm decisions about the need for training to bring prospective IRR returnees to an acceptable level of proficiency or to maintain their skills at a defined level. We recommend that the information provided by this report be evaluated/validated against a number of other considerations. Resource sponsors would be appropriate to validate training needs.

Data Review

As noted previously, the conclusions generated by the project staff are considered tentative and subject to verification. Generalizations from the data have also been limited because of the small numbers of questionnaires returned and because of suspected IRR data base inadequacies. It is believed, however, that much useful information can be gleaned from the descriptive summaries provided. Most of this information has not previously been available because of the many difficulties inherent in conducting skill deterioration research and restrictions on methods that can be used because of practical considerations. Maximum exploitation of the information that is now available is in order. A complete and accurate assessment of the meaning and action implications of the data should be made by individuals who are thoroughly knowledgeable of technical requirements of the CTI rating. The NAVTRASYSCEN, if requested, could assist SMEs in this effort. Areas to be considered in the review/validation process are discussed next.

Review Areas

For our study, SMEs from the Naval Technical Training Center (Corry Station) Detachment, Goodfellow AFB, San Angelo, Texas, identified the job tasks they thought would be appropriate for returning IRR CTI members to perform. Other SMEs may not agree on the list. Resource sponsors should determine if these are indeed the job tasks that an IRR returnee (at mobilization) should be able to perform. Further, a companion decision is required concerning the acceptability of the reported level of competency. Since active duty personnel report that they, on the average, now perform at these levels, these data reflect E-4 criterion performance. Resource sponsors should consider whether less proficiency would be acceptable. If so, attendant training requirements for IRRs with concomittant resource requirements would be lessened. On judging the need for training, task criticality, in terms of personnel or equipment safety, or mission success, as it interacts with recent changes to material, procedures, or equipment, must also be considered.

An additional decision factor concerns plans for utilization of IRR personnel at mobilization. If these individuals will serve as casualty replacements, then a fairly high level of proficiency at recall is desirable. Training, as determined by the study data and by the resource sponsor, should occur prior to recall. If, however, IRR members will replace current active duty personnel in less demanding assignments, then time would be available for receiving units or some especially chartered intermediate activity to provide needed training.

CONCLUSIONS

1. Mobilization planners should be aware that the size of the CTI IRR manpower pool may be smaller than believed. Approximately 31 to 32 percent of the pool may not be contactable by mail. An additional segment of unknown size may have already reenlisted and/or not be useful to the Navy for other reasons. A substantial percentage of CTIs listed in IRR files could also be beyond the zone of involuntary recall.

2. CTI IRR personnel who work in civilian occupations related to their CTI rating report less deterioration of skills than CTIs who are not similarly employed. This group should be considered for first recall priority.

3. Retraining for all CTIs, regardless of civilian occupation, appears necessary to support mobilization. Formal refresher training prior to recall appears to offer the best solution to training needs. This conclusion is subject to concurrence by subject matter expert CTIs.

4. Periodic maintenance training, after refresher training, would guard against future unwanted erosion of skills.

5. CTI personnel off active duty for greater than 3 years will probably require training on selected tasks to update skills.

RECOMMENDATIONS

1. Review, update, and validate the IRR data base content to assure that accurate assessments of the size of the IRR manpower pool are available at all times. Take whatever other steps are necessary and available to assure continuous updating of the data base.

2. Amend existing procedures where possible to obtain information from IRR members concerning civilian employment. At the very least, obtain this information from those eligible for or receiving bonuses for continued IRR service. Consider these individuals as first choice for mobilization recall.

3. Request resource sponsors review the data of this study. Determine if agreement can be reached that the tasks generated by schoolhouse SMEs adequately represent the CTI-3 job. Determine that the CTI-3 job is, in fact, acceptable as the target performance level for training to support mobilization. Request resource sponsors to consider the data of this study against factors such as changes to materials, procedures, equipment used by the rating, criticality of task performance, and mobilization plans for IRR personnel. Request resource sponsors determine the validity of data provided.

4. Issue appropriate tasking, if the conclusions of this study are accepted, to develop a specialized mobilization curriculum for refreshing basic skills, and refreshing and updating operational skills.

5. Task the NAVTECHTRACEN, Corry Station, to develop or assist development of a premobilization curriculum for CTI IRRs and a skill maintenance curriculum.

6. Recall a sample of CTI IRRs to assess their knowledge of current CTI-3 job requirements. Use this information to validate the data and conclusions of this study.

APPENDIX D

ANNEX 5

CRYPTOLOGIC TECHNICIAN (MAINTENANCE) (CTM): SKILL DETERIORATION DURING NAVY INDIVIDUAL READY RESERVE (IRR) MEMBERSHIP

INTRODUCTION

Following a first-tour of active duty, Naval personnel who do not elect other reserve options are assigned to the Individual Ready Reserve (IRR) to complete a specified Military Service Obligation (MSO); other personnel may voluntarily enlist in the IRR. IRR members, typically in a nonpay, nondrill status, are subject to recall to active duty if mobilization of the Armed Forces is ordered. A major concern of mobilization planners is that the skills acquired on active duty may deteriorate over time under the IRR condition of nonuse. This raises the question of the contribution that can be made by recalled IRR service members. To determine the extent and nature of skill deterioration during IRR membership, the Naval Training Systems Center (NAVTRASYSCEN), Code 10, conducted an assessment study. The study was performed at the request of the Chief of Naval Operations (OP-01R1).

This study assessed skill deterioration for 16 critical Navy ratings identified by OP-01. The designation "critical" was based on the criterion of projected personnel shortfalls for mobilization. The Cryptologic Technician (Maintenance) (CTM) rating was one of these 16.

PURPOSE OF THE STUDY

The purpose of the study was to assess skill deterioration during IRR membership and determine needs for training IRR personnel to restore, upgrade, or maintain their skills at minimum proficiency levels to support mobilization. Implicit in the tasking was the additional requirement to define minimum acceptable proficiency.

In a general sense, acceptable proficiency refers to the ability of a recalled ready reservist to make an effective contribution to a receiving unit's mission. In a more specific sense, it refers to ability to perform a defined set of job tasks at a defined level of competency. Performance proficiency information was essential to establish a baseline around which obtained skill deterioration information could be assessed and to define the terminal performance goals that any training regimen should attempt to achieve.

APPROACH

Complete details of the technical approach to the study are presented in the main body of this report. A brief description is presented here.

Mail-out questionnaires were used to obtain information. Five senior enlisted CTMs, assigned to the Naval Technical Training Center, Corry Station, Pensacola, FL, served as subject matter experts (SME) for questionnaire development. Under guidance given by the project staff, the CTM SMEs selected from various source materials a set of job tasks that, in their judgment, best represented the job (non-NEC specific) of an active duty CTM-3. This level was chosen in the belief that a recalled ready reservist who could perform CTM job tasks competently at the E-4 level would make a positive work contribution to a receiving unit.

The CTM-3 job task statements were used on questionnaires mailed to IRR and active duty personnel. Information sought concerned tasks performed and the level of competency attached to the performance of each. Level of competency was defined in terms of the amount of supervision needed to perform specific job tasks.

Questionnaires mailed to IRR personnel requested information about proficiency on each job task at the End of Active Obligated Service (EAOS) and at the present time (NOW). The difference between proficiency at EAOS and current proficiency would reflect skill deterioration during IRR membership.

Questionnaires mailed to active duty CTM-3s requested information about current proficiency on job tasks and proficiency expected after 2 years of nonperformance of the job tasks. The current proficiency estimates were needed to define criterion job performance for an active duty CTM-3. The data reflecting what is currently done on the job would define an acceptable level of performance. These data could be used as a baseline for judging amount and consequences of IRR skill deterioration. Copies of the data collection instruments are shown in the next section.

As of 10 December 1984, 170 CTMs were listed in Naval Military Personnel Command (NAVMILPERSCEN) computer files as assigned to the IRR. Names and addresses were obtained from NAVMILPERSCEN through the Naval Reserve Personnel Center (NAVRESPERSCEN). Questionnaires were mailed on 22 February 1985 under CNO (OP-11) cover letter to a random sample of 77 (45 percent). Coordination with the Commander, Naval Security Group (COMNAVSECGRU) had previously been accomplished. Because of a low initial return rate, a follow-up mailing (62) was made on 8 April 1985. Questionnaire returns were accepted until 24 May 1985.

Coordination with Commander in Chief, U.S. Atlantic Fleet (CINCLANTFLT), Commander in Chief, U.S. Pacific Fleet (CINCPACFLT), COMNAVSECGRU, and within CNO (OP-01) was accomplished for authorization to survey active duty CTM-3 personnel. A CTM-3 roster, current as of 2 August 1985, was obtained from NAVMILPERSCEN. From a pool of 792, a sample of 321 CTM-3s was determined using accepted survey research methods. Questionnaires were mailed on 18 September 1985 under CNO (OP-11) cover letter to unit/activity commanding officers for distribution to CTM-3s named. Returns were accepted until 31 December 1985. Returned questionnaires were scanned to determine data usability, and data were entered into computer files. Subsequently, summaries of the information of interest to the study were prepared.

RESULTS

Results pertinent to the assessment of CTM skill deterioration are presented in this section. All results presented concerning IRR CTMs must be considered as "information only" because of the very low sample size available.

QUESTIONNAIRE RETURN STATISTICS

Table D-5-1 shows, for both the IRR and active duty CTMs, the number of questionnaires mailed and number and percent of usable returns. For the IRR sample, the number/percent of nonvalid returns (nonvalid principally because of data base errors) is also shown. Percent usable returns was derived by dividing the number returned (11) by the number delivered (i.e., 77 - 31 = 46).

Table D-5-1

Questionnaire Return Statistics

Sample	No. Mailed	Usable Returns No.	Usable Returns %	Nonvalid No.	Nonvalid %
IRR	77	11	24	31	40
Active Duty	321	216	67		

QUESTIONNAIRE DATA SUMMARIES

Summaries of data obtained from the questionnaires are presented in table D-5-2 for IRR personnel and in table D-5-3 for active duty personnel. The tables are modified questionnaire forms.

Background Questions

Of 11 IRR CTMs answering the question, 7 (approximately 64 percent) reported that they now work in a civilian occupation related to their Navy CTM rating. Answers to the remaining two background questions for IRRs (see table D-5-2) are not reported since it was determined that the answers might be redundant and could not be unambiguously interpreted. Of the active duty respondents answering the background questions (see table D-5-3), 202 of 211 (95.7 percent) work in rating. One hundred and ninety-five (92 percent) are assigned sea duty.

Task Performance Data

The data summary tables (D-5-2 and D-5-3) show the number (F) and percent (%) of respondents reporting that they had never performed particular job tasks (i.e., they responded to the task description with a "1.") For IRRs, these data refer to the "at EAOS" answers and for active duty to the current (NOW) level of ability. A rank-order correlation (see Siegel, 1956) computed between the two sets of data ($\underline{r}_s = .538$, $p < .05$) indicated significant agreement between the two classes of respondents. Thus, tasks which have not been performed frequently by active duty CTMs (to date) are the same tasks that had not been performed frequently by IRRs at EAOS.

Table D-5-2

Overall Summary of CTM IRR Questionnaire Data

PART 1:

1. If necessary, correct your Service Number.
2. Is the work which you do NOW related to your Navy rating?
   Yes 7 No 4
3. Have you done PREVIOUS work which is related to your Navy rating since your Expiration of Active Obligated Service (EAOS)?
   Yes - No -
4. Have you received training related to your Navy rating since your Expiration of Active Obligated Service (EAOS)?
   Yes - No -

ANSWER KEY:

(1) Have never performed the task.

(2) Can/could do simple parts of the task (need direct supervision).

(3) Can/could do most parts of the task (need general supervision).

(4) Can/could do all parts of the task (need only occasional supervision. Meets minimum local speed and accuracy standards.)

(5) Can/could do complete task quickly and accurately (need no supervision).

PART 2:

For each job task statement below:

A. Indicate your CURRENT level of ability according to the answer key above.

B. Estimate your PREVIOUS level of ability at the time of your EAOS according to the answer key above.

"(1)" Choices

				A			B		
F	%		Tasks	N	Mean	SD	N	Mean	SD
1	1.3	1.	Effect changes to technical and maintenance publications.	11	3.90	1.446	11	3.03	1.433
1	1.3	2.	Perform maintenance and operational tests on equipment; align, adjust, and calibrate equipment; align frequency determining devices.	11	4.27	1.104	11	4.09	1.375
1	1.3	3.	Use general and/or special purpose test equipment and perform corrective maintenance on electronic and electromechanical equipment.	11	4.36	.924	11	4.36	1.206
1	1.3	4.	Identify basic solid state circuits and methods of biasing electronic circuits.	11	3.90	1.375	11	4.27	1.272
1	1.3	5.	Evaluate logic circuits; compute current, voltage, power, resistance, capacitance, and inductance.	11	4.09	1.375	11	4.00	1.414

Table D-5-2 (Continued)

1	1.3	6. Identify resistance and power handling capabilities of electrical conductors; test and replace batteries; adjust and repair charging and switching circuits; identify principles associated with rotating electrical machinery.	11	3.90	1.446	11	4.09	1.221
–	–	7. Complete maintenance data forms; order replacement parts and tools; inventory parts and tools; understand 3M system.	11	3.72	1.191	11	4.64	.674
–	–	8. Properly handle, stow, and destroy classified material.	11	3.90	1.375	11	5.00	–
2	2.6	9. Interpret functions of the NAVSECGRU; interpret SI security classification designations and categories.	11	3.64	1.286	11	4.00	1.612
–	–	10. Use and maintain portable power tools and hand tools.	11	4.82	.405	11	4.91	.302
4	5.2	11. Run diagnostic routines on general purpose and special purpose computers and peripheral equipment; record results.	11	4.36	1.027	11	3.24	1.902
1	1.3	12. Isolate communications circuit casualties.	11	3.63	1.286	11	4.00	1.414
1	1.3	13. Perform corrective and preventive maintenance on antennas.	11	3.46	1.508	11	4.46	1.214
		Overall Mean:		3.98				

Table D-5-3

Overall Summary of CTM Active Duty Questionniare Data

PART 1:

1. If necessary, correct your Service Number.
2. Does your current billet require you to work in your Navy rating?
   Yes 202 No 9
3. What type duty is your current billet?
   Sea 195 Shore 17

ANSWER KEY:

(1) Have never performed the task.

(2) Can/could do simple parts of the task (need direct supervision).

(3) Can/could do most parts of the task (need general supervision).

(4) Can/could do all parts of the task (need only occasional supervision. Meets minimum local speed and accuracy standards.)

(5) Can/could do complete task quickly and accurately (need no supervision).

PART 2:

For each job task statement below:

A. Use the answer key above to indicate your CURRENT level of ability.

B. Use the answer key above to estimate your EXPECTED level of ability after 2 years of not performing these tasks.

"(1)" Choices				A			B		
F	%		Tasks	N	Mean	SD	N	Mean	SD
52	24.1	1.	Effect changes to technical and maintenance publications.	216	3.34	1.553	213	2.97	1.390
7	3.3	2.	Perform maintenance and operational tests on equipment; align, adjust, and calibrate equipment; align frequency determining devices.	215	4.16	.939	214	3.31	1.007
1	.5	3.	Use general and/or special purpose test equipment and perform corrective maintenance on electronic and electromechanical equipment.	215	4.32	.787	215	3.43	.978
7	3.3	4.	Identify basic solid state circuits and methods of biasing electronic circuits.	215	3.90	1.009	213	3.14	1.128
6	2.8	5.	Evaluate logic circuits; compute current, voltage, power, resistance, capacitance, and inductance.	215	4.15	.942	215	3.30	1.187

Table D-5-3 (Continued)

13	6.0	6.	Identify resistance and power handling capabilities of electrical conductors; test and replace batteries; adjust and repair charging and switching circuits; identify principles associated with rotating electrical machinery.	215	3.73	1.120	213	3.09	1.113
2	.9	7.	Complete maintenance data forms; order replacement parts and tools; inventory parts and tools; understand 3M system.	214	4.35	.795	215	3.23	1.050
12	5.6	8.	Properly handle, stow, and destroy classified material.	215	4.09	1.107	216	3.44	1.211
18	8.4	9.	Interpret functions of the NAVSECGRU; interpret SI security classification designations and categories.	214	3.58	1.155	213	2.86	1.127
2	.9	10.	Use and maintain portable power tools and hand tools.	215	4.64	.766	215	4.37	1.000
29	13.5	11.	Run diagnostic routines on general purpose and special purpose computers and peripheral equipment; record results.	215	3.54	1.346	214	3.00	1.228
16	7.4	12.	Isolate communications circuit casualties.	215	3.77	1.176	215	3.12	1.200
83	38.4	13.	Perform corrective and preventive maintenance on antennas.	216	2.63	1.516	211	2.36	1.318

Tables D-5-2 and D-5-3 also show, for each task listed on a questionnaire, mean values for performance proficiency/competency, the standard deviation (SD) around the mean, and the number of cases (n) on which a mean is based. For the IRR sample, table D-5-2, the "A" column reflects current average ability level; the "B" column, EAOS average ability level. For the active duty sample (table D-5-3), the "A" column refers to current (NOW) ability and the "B" to proficiency expected after 2 years of nonperformance of a task.[1] A Pearson Product Moment Correlation ($r = .431$, $p > .05$) computed between task means for IRR EAOS and active duty NOW (current proficiency) values indicates that the IRR members, while on active duty, did not perform job tasks at competency levels equivalent to those of current job incumbents. However, the number of CTMs who responded to this survey is so small that this conclusion is equivocal.

For the IRR group, an overall grand mean for current proficiency was computed over all tasks for the rating. This single number indicates that considering the CTM-3 job in its entirety (as reflected by the tasks used) the average IRR member feels that he could now perform tasks of the rating at a level where only occasional supervision would be needed (mean = 3.98). Note again, however, that this mean is based on only 11 IRR CTMs. Consequently, little credence can be given.

For the active duty group, means reflecting proficiency on each job task for CTMs working/not working in their rating were computed. These are shown in table D-5-4. Again, the expected-after-2-years data are provided for information only.

SKILL DETERIORATION

Table D-5-5 displays task proficiency means for two subgroups of the CTM IRR respondents: (1) those who answered that they were now working, "W," in a field related to the Navy CTM rating and (2) those who indicated that they were not working ("N") in a related field. Both EAOS and NOW (current) proficiency means are given. These means, as well as those in table D-5-4, were computed from choices of 2, 3, 4, or 5 from the answer key. These choices place proficiency along a continuum from "Need direct supervision" through "Need no supervision."

As mentioned earlier, skill deterioration is reflected by differences between EAOS proficiency and NOW proficiency. In table D-5-5, values preceded by a minus sign represent a decrease in proficiency during IRR membership: current proficiency is less than EAOS proficiency. Values with no signs indicate increases in proficiency. The data are presented for information only.

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[1] These expected-after-2-years proficiency values were not used in subsequent analyses, however, since it was clear that many respondents did not understand the question being asked.

Table D-5-4

Task Mean Values for Two Subgroups of Active Duty CTMs

	Not Working ("N")[1]		Working ("W")[2]	
Task	NOW	EXP	NOW	EXP
1	4.200	3.400	4.103	3.404
2	4.250	3.250	4.272	3.385
3	4.625	3.625	4.328	3.472
4	3.625	3.000	4.031	3.303
5	4.125	3.250	4.260	3.450
6	3.750	3.000	3.926	3.250
7	4.625	3.500	4.367	3.273
8	4.714	4.143	4.251	3.592
9	4.000	3.333	3.812	3.011
10	4.333	4.222	4.683	4.402
11	3.667	3.000	3.954	3.316
12	4.125	3.000	4.011	3.335
13	4.000	3.000	3.654	3.030

Composite Mean:	Group W	NOW	4.127
		EXP	3.402
	Group N	NOW	4.157
		EXP	3.363
Overall Mean:		NOW	4.142
		EXP	3.383

[1] n = 9

[2] n = 202

Table D-5-5

Task Mean Values for Two Subgroups of IRR CTMs

	Not Working ("N")[1]		Working ("W")[2]		Mean Difference	
Task	NOW	EAOS	NOW	EAOS	"N"	"W"
1	3.750	3.750	4.500	4.000	0.000	0.500
2	3.250	4.000	4.857	4.667	-0.750	0.190
3	3.750	4.500	4.714	4.833	-0.750	-0.119
4	3.667	4.667	4.429	4.571	-1.000	-0.142
5	3.667	4.667	4.714	4.143	-1.000	0.571
6	3.667	4.667	4.429	4.286	-1.000	0.143
7	3.750	5.000	3.714	4.429	-1.250	-0.715
8	4.000	5.000	4.286	5.000	-1.000	-0.714
9	3.333	5.000	3.714	4.500	-1.667	-0.786
10	4.750	5.000	4.857	4.857	-0.250	0.000
11	4.000	4.333	4.571	4.750	-0.333	-0.179
12	3.667	5.000	4.000	4.000	-1.333	0.000
13	3.667	5.000	4.167	4.667	-1.333	-0.500

Composite Mean:	Group W	NOW	4.381
		EOS	4.516
	Group N	NOW	3.763
		EOS	4.660
Overall Mean:		NOW	4.072
		EOS	4.588

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[1] n = 4

[2] n = 7

TIME IN IRR

Table D-5-6 provides a breakdown of CTM personnel by time spent in the IRR prior to mail out of the questionnaires. The table also shows mean values, computed over all tasks of the rating, that were assigned for proficiency for 6-month intervals of IRR time, and for IRRs off active duty for more than 3 years. These mean values are shown for information only, since the number of individuals in each group is too small to permit meaningful quantitative interpretation.

Table D-5-6

Mean Proficiency Values for CTM IRR Respondents by Time Since EAOS

Time (Mos.) Since EAOS	Mean	No. of Cases
0-5	-	-
6-11	-	-
12-17	-	-
18-23	-	-
24-35	4.69	1
36+	3.91	10
Overall Mean	3.98	11

COMMENTS AND OBSERVATIONS

Comments and observations on the data are offered here. Interpretations relating to CTM IRR service members are not warranted, however, because of the small number involved. Legitimate conclusions concerning skill deterioration and retraining needs cannot be made. Comments on the CTM IRR data base and on active duty data are provided, however.

COMMENTS ON DATA BASE

Approximately 40 percent of questionnaires returned were classified as "nonvalid" (table D-5-1). This category reflects probable errors in the IRR data base. The nonvalid category included, most prominently, questionnaires returned by the Postal Service as undeliverable (bad addresses). It also included, but to a much smaller extent, questionnaires returned by respondents with comments such as: "No longer in IRR, returned to active duty, already received final discharge. Retiree recruited from another service, was never on active duty in the Navy." (All information concerning such cases was transmitted to the Naval Reserve Personnel Center on 26 September 1985). Finally, a very few questionnaires were returned by individuals who refused to provide information and, some, by relatives marked, "Deceased." From the above data, it can be concluded that about 40 percent of the CTM IRRs could not or would not be available for mobilization.

Questionnaires were presumably delivered by the Postal Service to a number of CTMs (76 percent) from whom no information was received. It is likely that many did not respond for reasons such as those cited above--they felt the questionnaire was not applicable. A further group, of unknown size, then would also be unavailable for mobilization because they are not in the viable IRR manpower pool as is currently believed. These considerations prompt a recommendation for review and validation of the CTM IRR roster.

Another data base issue that should be examined concerns the amount of time that CTM respondents have been away from active duty; i.e., since EAOS. Table D-5-6 shows that 91 percent (i.e., 10 out of 11) were in the IRR for more than 3 years. The reasons concerning why the data files did not contain many more IRR CTMs in the under 3 years since EAOS category should be determined.

Two issues emerge from time considerations: (1) the need for skill upgrading and (2) availability of IRR members. Upgrade training because of new equipment, procedures, or material will probably be required for these CTMs, but CTM SMEs must make this determination, however, based on changes to how the job is now performed.

A second consideration concerns the military service obligation (MSO). Those who are liable for a 6- or 8-year MSO (depending on when they entered on active duty) may be involuntarily recalled. Those who are beyond the MSO may only be recalled under existing agreements. If these agreements do not exist, still fewer individuals may be actually recallable for mobilization. The actual size of the available IRR manpower pool may be overestimated. Again, the recommendation is made that this data base be reviewed and validated if this is not already occurring.

TRAINING NEEDS

An important concern of this study was with determining the need for training CTM IRR personnel to acceptable proficiency levels prior to a mobilization recall. Although skill deterioration could not be assessed, data were obtained that define acceptable level of proficiency. The current proficiency levels reported by active duty personnel can be taken as E-4 (CTM-3) criterion performance; they reflect the level of proficiency claimed by the average CTM-3 now on active duty. These data may be used to establish the goals for any type of training program and also for assessing skill loss if data, and opportunity, are subsequently provided.

For effective future use of the data, the meaning of specific numerical values reported for task means must be clearly understood to reach conclusions about skill deterioration or training. Attention is directed to the "answer key" shown on either table D-5-2 or D-5-3. The answer key shows that a value of "4," for example, represents skilled performance with only a need for occasional supervision. Following conventional practice, we assume that a "4" is reflected by any values between 3.50 and 4.49. A "3" is interpreted similarly. Thus, skill deterioration may be shown by lower mean values for NOW (i.e., current) versus EAOS proficiency. However, the change from EAOS scores may not be sufficient to move the IRR respondents to a lower proficiency category. For example, skill loss on tasks 7 to 9 occurred for the IRRs working in a related field (see table D-5-5). However, the losses reported resulted in the IRRs remaining in the "4" category. We would conclude that the deterioration is of no consequence insofar as signaling a need for retraining.

Assessment of the need for training reserve personnel against mobilization would proceed with the application of similar logic. In this case, the task mean values for "current" proficiency (i.e., after skill deterioration has occurred) of IRR personnel would be compared to the values for active duty (working in rating) personnel. If the values, in each case, fall into the same proficiency categories, a fair conclusion would be that training of IRRs would probably not be required before mobilization to bring proficiency to an acceptable level.

An additional factor to consider in assessing needs for training, however, concerns time since EAOS. For IRRs who have been away from active duty for more than 3 years, skill upgrade training should be considered to respond to any technical changes (e.g., new equipment, materials, procedures) in the field.

CONCLUSIONS

1. Mobilization planners should be aware that the IRR CTM data base is much smaller than would be expected.

2. Conclusions concerning skill deterioration and training needs of CTM IRRs cannot be provided because of the small number of individuals that returned usable questionnaires.

3. Data obtained from the active duty sample of CTM-3s can be used to establish training programs for CTMs. They can also be used in future efforts to assess implications of skill loss information that may subsequently become available.

RECOMMENDATIONS

1. Review, update, and validate the CTM IRR data base content to assure that accurate assessments of the size of the manpower pool are available at all times. Take whatever other steps are necessary and available to assure continuous updating of the data base.

2. Request resource sponsors review the data of this study. Determine if agreement can be reached that the tasks generated by schoolhouse SMEs adequately represent the CTM-3 job. Determine that the CTM-3 job is, in fact, acceptable as the target performance level for returning CTM IRRs.

3. Consider recalling a sample of CTM IRRs to assess their knowledge of current CTM-3 job requirements. Use the data of this study as a baseline for decisions about skill loss and retraining needs.

APPENDIX D

ANNEX 6

CRYPTOLOGIC TECHNICIAN (COMMUNICATIONS) (CTO): SKILL DETERIORATION DURING NAVY INDIVIDUAL READY RESERVE (IRR) MEMBERSHIP

INTRODUCTION

Following a first-tour of active duty, Naval personnel who do not elect other reserve options are assigned to the Individual Ready Reserve (IRR) to complete a specified Military Service Obligation (MSO); other personnel may voluntarily enlist in the IRR. IRR members, typically in a nonpay, nondrill status, are subject to recall to active duty if mobilization of the Armed Forces is ordered. A major concern of mobilization planners is that the skills acquired on active duty may deteriorate over time under the IRR condition of nonuse. This raises the question of the contribution that can be made by recalled IRR service members. To determine the extent and nature of skill deterioration during IRR membership, the Naval Training Systems Center (NAVTRASYSCEN), Code 10, conducted an assessment study. The study was performed at the request of the Chief of Naval Operations (OP-01R1).

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In a general sense, acceptable proficiency refers to the ability of a recalled ready reservist to make an effective contribution to a receiving unit's mission. In a more specific sense, it refers to ability to perform a defined set of job tasks at a defined level of competency. Performance proficiency information was essential to establish a baseline around which obtained skill deterioration information could be assessed and to define the terminal performance goals that any training regimen should attempt to achieve.

APPROACH

Complete details of the technical approach to the study are presented in the main body of this report. A brief description is presented here.

Mail-out questionnaires were used to obtain information. Five senior enlisted CTOs, assigned to the Naval Technical Training Center, Corry Station, Pensacola, FL, served as subject matter experts (SME) for questionnaire development. Under guidance given by the project staff, the CTO SMEs selected from various source materials a set of job tasks that, in their judgment, best represented the job (non-NEC specific) of an active duty CTO-3. This level was chosen in the belief that a recalled ready reservist who could perform CTO job tasks competently at the E-4 level would make a positive work contribution to a receiving unit.

The CTO-3 job task statements were used on questionnaires mailed to IRR and active duty personnel. Information sought concerned tasks performed and the level of competency attached to the performance of each. Level of competency was defined in terms of the amount of supervision needed to perform specific job tasks.

Questionnaires mailed to IRR personnel requested information about proficiency on each job task at the End of Active Obligated Service (EAOS) and at the present time (NOW). The difference between proficiency at EAOS and current proficiency would reflect skill deterioration during IRR membership.

Questionnaires mailed to active duty CTO-3s requested information about current proficiency on job tasks and proficiency expected after 2 years of nonperformance of the job tasks. The current proficiency estimates were needed to define criterion job performance for an active duty CTO-3. The data reflecting what is currently done on the job would define an acceptable level of performance. These data could be used as a baseline for judging amount and consequences of IRR skill deterioration. Copies of these data collection instruments are shown in the next section.

As of 10 December 1984, 820 CTOs were listed in Naval Military Personnel Command (NAVMILPERSCOM) computer files as assigned to the IRR. Names and addresses were obtained from NAVMILPERSCOM through the Naval Reserve Personnel Center (NAVRESPERSCEN). Questionnaires were mailed under CNO (OP-11) cover letter on 21 February 1985 to a random sample of 500 (61 percent). Coordination with the Commander, Naval Security Group (COMNAVSECGRU) had previously been accomplished. Because of a low initial return rate, a follow-up mailing (336) was made on 8 April 1985. Questionnaire returns were accepted until 24 May 1985.

Coordination with Commander in Chief, U.S. Atlantic Fleet (CINCLANTFLT), Commander in Chief, U.S. Pacific Fleet (CINCPACFLT), COMNAVSECGRU, and within CNO (OP-01) was accomplished for authorization to survey active duty CTO-3 personnel. A CTO-3 roster, current as of 2 August 1985, was obtained from NAVMILPERSCOM. From a pool of 515, a sample of 279 CTO-3s was determined using accepted survey research methods. Questionnaires were mailed on 18 September 1985 under CNO (OP-11) cover letter to unit/activity commanding officers for distribution to CTO-3s named. Returns were accepted until 31 December 1985. Returned questionnaires were scanned to determine data usability, and data were entered into computer files. Subsequently, summaries of the information of interest to the study were prepared.

RESULTS

Results pertinent to the assessment of CTO skill deterioration are presented in this section.

QUESTIONNAIRE RETURN STATISTICS

Table D-6-1 shows, for both the IRR and active duty CTOs, the number of questionnaires mailed and number and percent of usable returns. For the IRR sample, the number/percent of nonvalid returns (nonvalid principally because of data base errors) is also shown. Percent usable returns was derived by dividing the number returned (14) by the number delivered (i.e., 500 - 127 = 373).

Table D-6-1

Questionnaire Return Statistics

Sample	No. Mailed	Usable Returns No.	Usable Returns %	Nonvalid No.	Nonvalid %
IRR	500	114	30.6	127	25.4
Active Duty	279	184	65.9		

QUESTIONNAIRE DATA SUMMARIES

Summaries of data obtained from the questionnaires are presented in table D-6-2 for IRR personnel and in table D-6-3 for active duty personnel. The tables are modified questionnaire forms.

Background Questions

Of 112 IRR CTOs answering the question, 24 (approximately 21 percent) reported that they now work in a civilian occupation related to their Navy CTO rating. Answers to the remaining two background questions for IRRs (see table D-6-2) are not reported since it was determined that the answers might be redundant and could not be unambiguously interpreted. Of the active duty respondents answering the background questions (see table D-6-3), 163 of 181 (90 percent) work in rating. One hundred and forty-nine (82 percent) are assigned sea duty.

Task Performance Data

The data summary tables (D-6-2 and D-6-3) show the number (F) and percent (%) of respondents reporting that they had never performed particular job tasks (i.e., they responded to the task description with a "1.") For IRRs, these data refer to the "at EAOS" answers and for active duty to the current (NOW) level of ability. A rank-order correlation (see Siegel, 1956) computed between the two sets of data ($\underline{r} = .846$, $p < .05$) indicated significant agreement between the two classes of respondents. Thus, tasks which have not been performed frequently by active duty CTOs (to date) are the same tasks that had not been performed frequently by IRRs at EAOS.

Table D-6-2

Overall Summary of CTO IRR Questionnaire Data

PART 1:

1. If necessary, correct your Service Number.
2. Is the work which you do NOW related to your Navy rating?
   Yes 24 No 88
3. Have you done PREVIOUS work which is related to your Navy rating since your Expiration of Active Obligated Service (EAOS)?
   Yes - No -
4. Have you received training related to your Navy rating since your Expiration of Active Obligated Service (EAOS)?
   Yes - No -

ANSWER KEY:

(1) Have never performed the task.

(2) Can/could do simple parts of the task (need direct supervision).

(3) Can/could do most parts of the task (need general supervision).

(4) Can/could do all parts of the task (need only occasional supervision. Meets minimum local speed and accuracy standards.)

(5) Can/could do complete task quickly and accurately (need no supervision).

PART 2:

For each job task statement below:

A. Indicate your CURRENT level of ability according to the answer key above.

B. Estimate your PREVIOUS level of ability at the time of your EAOS according to the answer key above.

"(1)" Choices				A			B		
F	%		Tasks	N	Mean	SD	N	Mean	SD
1	.9	1.	Maintain operating logs, records, and files.	113	3.97	1.089	111	4.83	.537
4	3.6	2.	Enter corrections to communications publications.	114	3.83	1.221	112	4.57	.887
2	1.8	3.	Account for, handle, stow, transmit, and destroy classified material.	114	3.79	1.237	112	4.73	.600
2	1.8	4.	Change ribbons, paper, and tape on teletypewriter, adjust teleprinter controls to provide desired page or tape copy.	114	4.30	1.055	112	4.87	.577
1	.9	5.	Stand watch on teletypewriter circuit.	114	3.98	1.175	112	4.86	.551
35	31.3	6.	Operate streamliner.	114	2.36	1.311	112	3.2	1.726
34	31.8	7.	Operate TACINTEL.	109	2.39	1.312	107	3.44	1.760

Table D-6-2 (Continued)

2	1.8	8. Prepare CRITIC, plaindress, abbreviated plaindress, and address messages in proper format; read chad tape (30 characters per minute).	112	2.84	1.143	111	4.69	.763
6	5.5	9. Prepare messages in OPS COM format.	112	2.95	1.207	110	4.56	1.009
39	34.8	10. Change combination of three tumbler and cipher type combination locking devices.	114	2.50	1.459	112	3.19	1.763
9	8.0	11. Determine message handling procedures required during minimize; prepare and deliver messages by physical means.	114	3.16	1.252	112	4.31	1.193
21	19.3	12. Identify fundamentals of the World-wide Autodin Restoral Plan.	113	2.39	1.250	109	3.55	1.530
6	5.4	13. Operate technical control equipment.	114	3.12	1.318	111	4.35	1.125
		14. I can/could type.	108	40wpm	17.118	112	51wpm	13.252
		Overall Mean:		3.23				

Table D-6-3

Overall Summary of CTO Active Duty Questionnaire Data

PART 1:

1. If necessary, correct your Service Number.
2. Does your current billet require you to work in your Navy rating?
   Yes 163 No 18
3. What type duty is your current billet?
   Sea 149 Shore 32

ANSWER KEY:

(1) Have never performed the task.

(2) Can/could do simple parts of the task (need direct supervision).

(3) Can/could do most parts of the task (need general supervision).

(4) Can/could do all parts of the task (need only occasional supervision. Meets minimum local speed and accuracy standards.)

(5) Can/could do complete task quickly and accurately (need no supervision).

PART 2:

For each job task statement below:

A. Use the answer key above to indicate your CURRENT level of ability.

B. Use the answer key above to estimate your EXPECTED level of ability after 2 years of not performing these tasks.

"(1)" Choices				A			B		
F	%		Tasks	N	Mean	SD	N	Mean	SD
1	.5	1.	Maintain operating logs, records, and files.	184	4.69	.642	177	3.83	.958
24	13.2	2.	Enter corrections to communications publications.	182	4.15	1.390	174	3.80	1.268
7	3.9	3.	Account for, handle, stow, transmit, and destroy classified material.	181	4.49	.952	176	3.70	1.061
-	-	4.	Change ribbons, paper, and tape on teletypewriter, adjust teleprinter controls to provide desired page or tape copy.	184	4.89	.329	178	4.30	.882
6	3.3	5.	Stand watch on teletypewriter circuit.	184	4.68	.830	179	3.94	1.080
85	47.2	6.	Operate streamliner.	180	2.51	1.653	166	2.18	1.299
86	46.1	7.	Operate TACINTEL.	184	2.60	1.693	169	2.28	1.350

Table D-6-3 (Continued)

1	.5	8. Prepare CRITIC, plaindress, abbreviated plaindress, and address messages in proper format; read chad tape (30 characters per minute).	184	4.14	.910	178	2.93	.997
25	13.8	9. Prepare messages in OPS COM format.	181	3.93	1.375	177	3.04	1.249
90	48.9	10. Change combination of three tumbler and cipher type combination locking devices.	184	2.47	1.622	169	2.24	1.387
21	11.5	11. Determine message handling procedures required during minimize; prepare and deliver messages by physical means.	183	3.75	1.342	176	3.06	1.234
20	11.0	12. Identify fundamentals of the World-wide Autodin Restoral Plan.	182	3.46	1.246	177	2.63	1.152
22	12.1	13. Operate technical control equipment.	183	3.59	1.395	177	2.81	1.227
		14. I can/could type.						

Tables D-6-2 and D-6-3 also show, for each task listed on a questionnaire, mean values for performance proficiency/competency, the standard deviation (SD) around the mean, and the number of cases (n) on which a mean is based. For the IRR sample, table D-6-2, the "A" column reflects current average ability level; the "B" column, EAOS average ability level. For the active duty sample (table D-6-3), the "A" column refers to current (NOW) ability and the "B" to proficiency expected after 2 years of nonperformance of a task.[1] A Pearson Product Moment Correlation ($r = .957$, $p < .05$) computed between task means for IRR EAOS and active duty NOW (current proficiency) values indicates that the IRR members, while on active duty, performed job tasks at competency levels equivalent to those of current job incumbents.

For the IRR group, an overall grand mean for current proficiency was computed over all tasks for the rating. This single number indicates that considering the CTO-3 job in its entirety (as reflected by the tasks used) the average IRR member feels that he could now perform tasks of the rating at a level where general supervision would be needed (mean = 3.2).

For the active duty group, means reflecting proficiency on each job task for CTOs working/not working in their rating were computed. These are shown in table D-6-4. Again, the expected-after-2-years data are provided for information only.

SKILL DETERIORATION

Table D-6-5 displays task proficiency means for two subgroups of the CTO IRR respondents: (1) those who answered that they were now *working* ("W") in a field related to the Navy CTO rating and (2) those who indicated that they were *not working* ("N") in a related field. Both EAOS and NOW (current) proficiency means are given. These means, as well as those in table D-6-4, were computed from choices of 2, 3, 4, or 5 from the answer key. These choices place proficiency along a continuum from "Need direct supervision" through "Need no supervision."

As mentioned earlier, skill deterioration is reflected by differences between EAOS proficiency and NOW proficiency. In table D-6-5, values preceded by a minus sign represent a decrease in proficiency during IRR membership: current proficiency is less than EAOS proficiency. Values with no signs would indicate increases in proficiency.

The table shows that, since EAOS, all CTOs lost proficiency on all job tasks. Although the differences are not large, CTOs who now work ("W") in a field related to their former active duty jobs reported less skill deterioration over all but one (task no. 10) of the 13 rating tasks than the "N" subgroup. Statistical tests (t tests for independent means; see

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[1] These expected-after-2-years proficiency values were not used in subsequent analyses, however, since it was clear that many respondents did not understand the question being asked.

Table D-6-4

Task Mean Values for Two Subgroups of Active Duty CTOs

Task	Not Working ("N")[1] NOW	Not Working ("N")[1] EXP	Working ("W")[2] NOW	Working ("W")[2] EXP
1	4.556	3.500	4.722	3.890
2	4.571	3.429	4.641	4.126
3	4.471	3.588	4.649	3.834
4	4.889	3.944	4.902	4.352
5	4.611	3.500	4.822	4.071
6	3.600	2.556	3.894	3.094
7	2.750	2.333	4.111	3.278
8	4.059	2.800	4.166	3.039
9	4.111	2.900	4.428	3.376
10	4.000	3.167	3.818	3.169
11	3.933	2.929	4.117	3.396
12	4.000	2.917	3.721	2.903
13	3.600	2.714	3.946	3.142

Composite Mean:	Group W	NOW	4.303
		EXP	3.513
	Group N	NOW	4.089
		EXP	3.098
Overall Mean:		NOW	4.196
		EXP	3.306

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[1] n = 18

[2] n = 163

Table D-6-5

Task Mean Values for Two Subgroups of IRR CTOs

	Not Working ("N")[1]		Working ("W")[2]		Mean Difference	
Task	NOW	EAOS	NOW	EAOS	"N"	"W"
1	3.966	4.849	4.571	4.913	-0.883	-0.342
2	3.919	4.741	4.286	4.591	-0.822	-0.305
3	4.024	4.793	4.053	4.500	-0.769	-0.447
4	4.356	4.953	4.682	4.870	-0.597	-0.188
5	4.091	4.897	4.421	4.870	-0.806	-0.449
6	2.930	4.155	3.813	4.579	-1.225	-0.766
7	3.086	4.596	3.308	4.500	-1.510	-1.192
8	2.963	4.729	3.368	4.826	-1.766	-1.458
9	3.175	4.790	3.333	4.682	-1.615	-1.349
10	3.368	4.333	3.400	4.438	-0.965	-1.038
11	3.275	4.582	3.905	4.696	-1.307	-0.791
12	2.937	4.194	3.059	4.048	-1.257	-0.989
13	3.244	4.464	4.294	4.850	-1.220	-0.556

Composite Mean:	Group W	NOW	3.884
		EOS	4.643
	Group N	NOW	3.487
		EOS	4.621
Overall Mean:		NOW	3.686
		EOS	4.632

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[1] n = 88

[2] n = 24

Guilford and Fruchter, 1973) indicated that over all tasks of the CTO rating, the proficiency of the two subgroups was equivalent at EAOS ($\underline{t} = .2228$, $\underline{p} < .4128$). Task mean proficiency values differed significantly ($\underline{\bar{t}} = 1.92$, $\underline{p} < .0334$) on current (NOW) proficiency.

TIME IN IRR

Table D-6-6 provides a breakdown of CTO personnel by time spent in the IRR prior to mail out of the questionnaires. The table also shows mean values assigned for proficiency for 6-month intervals of IRR time, and for IRRs off active duty for more than 3 years. These mean values are shown for information only, since the number of individuals in each group is too small to permit meaningful quantitative interpretation.

Table D-6-6

Mean Proficiency Values for CTO IRR Respondents by Time Since EAOS

Time (Mos.) Since EAOS	Mean	No. of Cases
0-5	3.72	3
6-11	-	-
12-17	-	-
18-23	-	-
24-35	3.47	4
36+	3.20	98
Overall Mean	3.23	105

COMMENTS AND OBSERVATIONS

Comments and observations on the data are offered here. As warranted, interpretations are made and discussed. These interpretations provide the basis for certain conclusions about skill deterioration and retraining needs. Our conclusions are based on best available data. However, they are subject to validation. The low questionnaire return rate coupled with the uncertain quality of the IRR data base (discussed below) require cautious inferences and limit generalizations. Nevertheless, the results do provide much useful information about the IRR that has not been available previously. They also suggest directions that should be taken with respect to the management and utilization of the IRR resource.

COMMENTS ON DATA BASE

Approximately 25 percent of questionnaires returned were classified as "nonvalid" (table D-6-1). This category reflects probable errors in the IRR data base. The nonvalid category included, most prominently, questionnaires returned by the Postal Service as undeliverable (bad addresses). It also included, but to a much smaller extent, questionnaires returned by respondents with comments such as: "No longer in IRR, returned to active duty, already received final discharge. Retiree recruited from another service, was never on active duty in the Navy." (All information concerning such cases was transmitted to the Naval Reserve Personnel Center on 26 September 1985). Finally, a very few questionnaires were returned by individuals who refused to provide information and, some, by relatives marked, "Deceased." From the above data, it can be concluded that about 25 percent of the CTO IRRs could not or would not be available for mobilization.

Questionnaires were presumably delivered by the Postal Service to a number of CTOs (69 percent) from whom no information was received. It is likely that many did not respond for reasons such as those cited above--they felt the questionnaire was not applicable. A further group, of unknown size, then would also be unavailable for mobilization because they are not in the viable IRR manpower pool as is currently believed. These considerations prompt a recommendation for review and validation of the CTO IRR roster.

Another data base issue that should be examined concerns the amount of time that CTO respondents have been away from active duty. This information is given in table D-6-6. By extrapolation, only 7 percent of the CTOs were in the IRR for 3 years or less. A greater number would have been expected. The reasons for this small number should be determined.

Two issues emerge from time considerations: (1) the need for skill upgrading and (2) availability of IRR members. Upgrade training because of new equipment, procedures, or material will probably be required for the 93 percent of CTOs who have been in the IRR more than 3 years.

A second consideration concerns the military service obligation (MSO). Those who are liable for a 6- or 8-year MSO (depending on when they entered on active duty) may be involuntarily recalled. Those who are beyond the MSO may only be recalled under existing agreements. If these agreements do not exist, still fewer individuals may be actually recallable for mobilization. The size of the pool of manpower available may be overestimated. In the CTO case, there is the additional consideration of the very small number of individuals in the IRR files who were listed as being away from active duty for 3 years or less. A greater number would be expected given MSO requirements. Again, the recommendation is made that the IRR data base be reviewed and validated.

SKILL DETERIORATION

Information directly pertinent to the question of skill deterioration was presented in table D-6-5. In table D-6-5, differences between mean values at EAOS and NOW (current proficiency) are shown. Values preceded by a minus sign represent skill deterioration potentially attributable to time spent in the IRR.

Approximately 21 percent of CTO IRRs reported that they now work in a civilian occupation related to the CTO rating, and the effects of this work experience on skill deterioration will be considered next. As table D-6-5 shows, those who now work ("W") in a related field reported less skill deterioration than the "N" subgroup for all but one of the 13 job tasks. Taken over all tasks, differences between the current (NOW) proficiency means for the two subgroups were statistically significant. Also, they could not be attributed to initial differences between the groups at EAOS. Thus, civilian CTO-related employment significantly affected skill deterioration. Those continuing to work in the field after EAOS reported less deterioration. The tasks on which the greatest amount of skill deterioration occurred are easily identifiable from table D-6-5.

TRAINING NEEDS

While skill deterioration information is of interest in its own right, the more important concern of this study is with determining the need for training IRR personnel prior to mobilization. Thus, the implications of skill deterioration data must be assessed against the criterion of acceptable level of proficiency. This can be done most directly by comparing the current proficiency levels reported by CTO IRRs against the levels reported by active duty CTO-3s. The task means for the active duty sample can be taken as E-4 criterion performance since they reflect the level of proficiency claimed by the average CTO-3 now on active duty.

The meaning of specific numerical values reported for task means must be clearly understood before conclusions about skill deterioration or training needs can be addressed. Attention is directed to the "answer key" shown on either table D-6-2 or D-6-3. The answer key shows that a value of "4," for example, represents skilled performance with only a need for occasional supervision. Following conventional practice, we assume that a "4" is reflected by any values between 3.50 and 4.49. A "3" is interpreted similarly. Skill deterioration may be shown by lower mean values for NOW (i.e., current) versus EAOS proficiency. However, the change from EAOS scores may not be sufficient to move the IRR respondents to a lower proficiency category. For example, skill loss occurred on task 3 for all IRRs (see table D-14-5). However, the losses reported resulted in the IRRs remaining in the "4" category (see table D-6-5). We would conclude that the deterioration is of no consequence.

Assessment of the need for training IRR personnel against mobilization should proceed with the application of similar logic. Table D-6-7 below presents the task mean values reported for current (NOW) proficiency by IRR personnel who are not working in a field related to the CTO rating and also for those who are working in a related field. These values are from table D-6-5. Task proficiency means for active duty personnel working in their rating (taken from table D-6-4) are also shown in table D-6-7. Inspection of the data shows considerable variation in the mean values. Assuming that CTO IRR returnees should exhibit essentially the same proficiency (i.e., be in the same proficiency category) as active duty personnel, we conclude that training prior to mobilization should occur for at least the tasks indicated (*) in the table.

Table D-6-7

Task Mean Proficiency Values for IRR and Active Duty CTOs

	IRR		Active Duty
Tasks	Not in Field	In Field	In Rating
1	4.0	4.6	4.7
2	3.9	4.3	4.6
3	4.0	4.1	4.6
4	4.4	4.7	4.9
5	4.1	4.4	4.8
6	2.9*	3.8	3.9
7	3.1*	3.3*	4.1
8	2.9*	3.4*	4.2
9	3.2*	3.3*	4.4
10	3.4*	3.4*	3.8
11	3.3*	3.9	4.1
12	2.9*	3.1*	3.7
13	3.2*	4.3	3.9
14	-	-	-

*Probable training need.

From our assessment, the current level of proficiency of CTO IRRs on some job tasks is probably adequate. Retraining and/or maintenance training prior to a mobilization recall should be considered for the tasks shown in the table, however. For tasks not starred (*), a modicum of refamiliarization at mobilization will probably suffice to restore lost skill. This could probably be given by close, corrective supervision while the returnee is performing job tasks. This conclusion is especially relevant to the IRR CTOs who continue to work in a related occupation.

An additional factor to consider in assessing needs for CTO training concerns time since EAOS. Ninety-three percent of the CTO IRRs were away from active duty for more than 3 years (see table D-6-6). Subject matter experts who review the data provided here will probably determine that skill upgrade training is also required because of technical changes (e.g., in equipment, materials, procedures) in the field. All in all, based on what is known of the CTO IRR manpower base, our principal recommendation is that formal training be considered for this group of reservists. This training should occur prior to mobilization. Given the classified nature of the CTO job, training should be developed and implemented at the CTO "A" School using a premobilization curriculum. Training emphasis should be on the tasks identified in table D-6-7.

VALIDATION OF DATA

Our analyses indicate that there is a need for training CTO IRRs against mobilization requirements. It would appear that required proficiency (i.e., the level shown by current job incumbents) can be achieved by familiarization training under direct corrective supervision for only a few job tasks. Principally because of the long time periods since EAOS, we feel that comprehensive retraining for most rating tasks, such as would be provided in a formal school setting, is needed. Information not readily available to the project staff is required, however, for firm decisions about the type and amount of training needed. We also recommend that the information provided by this report be evaluated/validated against certain other considerations. Resource sponsors would be appropriate to validate training needs.

Data Review

As noted previously, the conclusions generated by the project staff are considered tentative and subject to verification. Generalizations from the data are limited because of the small numbers of questionnaires returned and because of suspected IRR data base inadequacies. It is believed, however, that much useful information can be gleaned from the descriptive summaries provided. Most of this information has not previously been available because of the many difficulties inherent in conducting skill deterioration research and restrictions on methods that can be used because of practical considerations. Maximum exploitation of the information that is now available is in order. A complete and accurate assessment of the meaning and action implications of the data should be made by individuals who are thoroughly knowledgeable of technical requirements of the CTO rating. The NAVTRASYSCEN, if requested, could assist SMEs in this effort. Areas to be considered in the review/validation process are discussed next.

Review Areas

For our study, SMEs from the CTO "A" School at Corry Station, Pensacola, FL, identified the job tasks they thought would be appropriate for returning IRR CTO members to perform. Other SMEs may not agree on the list. Resource sponsors should determine if these are indeed the job tasks that an IRR returnee (at mobilization) should be able to perform. Further, a companion decision is required concerning the acceptability of the reported level of competency. Since active duty personnel report that they, on the average, now perform at these levels, the data reflect E-4 criterion performance. Resource sponsors should consider whether less proficiency would be acceptable. If so, attendant training requirements for IRRs with concomittant resource requirements would be lessened. On judging the need for training, task criticality, in terms of personnel or equipment safety, or mission success, as it interacts with recent changes to material, procedures, or equipment, must also be considered.

An additional decision factor concerns plans for utilization of CTO IRR personnel at mobilization. If these individuals will serve as casualty replacements, then a fairly high level of proficiency at recall is desirable. Training, as determined by the study data and by the resource sponsor, should occur prior to recall. If, however, IRR members will replace current active duty personnel in less demanding assignments, then time would be available for receiving units or some especially chartered intermediate activity to provide needed training. Likely, some of this training could be done either on the job or in on-the-job type conditions where IRR returnees could demonstrate their ability to perform job tasks under close, corrective supervision. It is our belief, however, based on available data that "desired" proficiency on many job tasks can only be achieved through formal training. Tasking of the Naval Technical Training Center, Corry Station, to develop a premobilization curriculum for CTOs should be considered.

CONCLUSIONS

1. Mobilization planners should be aware that the size of the CTO IRR manpower pool may be smaller than believed. Approximately 25 percent of the pool may not be contactable by mail. An additional segment of unknown size may have already reenlisted and/or not be useful to the Navy for other reasons. A substantial percentage of CTOs listed in IRR files could also be beyond the zone of involuntary recall.

2. CTO IRR personnel who work in civilian occupations related to their Navy rating reported less deterioration of skills than CTOs not similarly employed. This group should be considered for first recall priority.

3. Refresher and maintenance training for all CTOs appears necessary prior to mobilization for many job tasks. Familiarization training at recall consisting of supervised practice may suffice for other tasks. This conclusion is subject to concurrence by subject matter expert CTOs.

4. Ninety-three percent of the CTO personnel in this sample were away from active duty for greater than 3 years. This group will undoubtedly require premobilization training to update skills.

RECOMMENDATIONS

1. Review, update, and validate the IRR data base content to assure that accurate assessments of the size of the CTO IRR manpower pool are available at all times. Take whatever other steps are necessary and available to assure continuous updating of the data base.

2. Amend existing procedures where possible to obtain information from IRR members concerning civilian employment. At the very least, obtain this information from those eligible for or receiving bonuses for continued IRR service. Consider these individuals as first choice for mobilization recall.

3. Request resource sponsors review the data of this study. Determine if agreement can be reached that the tasks generated by schoolhouse SMEs adequately represent the CTO-3 job. Determine that the CTO-3 job is, in fact, acceptable as the target performance level for returning CTO IRRs. Request resource sponsors consider the data against factors such as changes to materials, procedures, equipment used by the rating, criticality of task performance, and mobilization plans for IRR personnel.

4. Consider recalling a sample of CTO IRRs to assess their knowledge of current CTO-3 job requirements. Use this information to validate the data and conclusions of this study.

5. Task the NAVTECHTRACEN, Corry Station, to develop a premobilization curriculum for refrehser training of CTO IRRs. Use data provided from this study to identify training emphases and, also, requirements for inclusion of instructional modules for skill upgrade training.

6. Task the NAVTECHTRACEN, Corry Station, to develop a CTO skill maintenance training program for IRR CTOs.

APPENDIX D

ANNEX 7

CRYPTOLOGIC TECHNICIAN (COLLECTION) (CTR): SKILL DETERIORATION DURING NAVY INDIVIDUAL READY RESERVE (IRR) MEMBERSHIP

INTRODUCTION

Following a first-tour of active duty, Naval personnel who do not elect other reserve options are assigned to the Individual Ready Reserve (IRR) to complete a specified Military Service Obligation (MSO); other personnel may voluntarily enlist in the IRR. IRR members, typically in a nonpay, nondrill status, are subject to recall to active duty if mobilization of the Armed Forces is ordered. A major concern of mobilization planners is that the skills acquired on active duty may deteriorate over time under the IRR condition of nonuse. This raises the question of the contribution that can be made by recalled IRR service members. To determine the extent and nature of skill deterioration during IRR membership, the Naval Training Systems Center (NAVTRASYSCEN), Code 10, conducted an assessment study. The study was performed at the request of the Chief of Naval Operations (OP-01R1).

This study assessed skill deterioration for 16 critical Navy ratings identified by OP-01. The designation "critical" was based on the criterion of projected personnel shortfalls for mobilization. The Cryptologic Technician (Collection) (CTR) rating was one of these 16.

PURPOSE OF THE STUDY

The purpose of the study was to assess skill deterioration during IRR membership and determine needs for training IRR personnel to restore, upgrade, or maintain their skills at minimum proficiency levels to support mobilization. Implicit in the tasking was the additional requirement to define minimum acceptable proficiency.

In a general sense, acceptable proficiency refers to the ability of a recalled ready reservist to make an effective contribution to a receiving unit's mission. In a more specific sense, it refers to ability to perform a defined set of job tasks at a defined level of competency. Performance proficiency information was essential to establish a baseline around which obtained skill deterioration information could be assessed and to define the terminal performance goals that any training regimen should attempt to achieve.

APPROACH

Complete details of the technical approach to the study are presented in the main body of this report. A brief description is presented here.

Mail-out questionnaires were used to obtain information. Six senior enlisted CTRs, assigned to the Naval Technical Training Center, Corry Station, Pensacola, FL, served as subject matter experts (SME) for questionnaire development. Under guidance given by the project staff, the CTR SMEs selected from various source materials a set of job tasks that, in their judgment, best represented the job (non-NEC specific) of an active duty CTR-3. This level was chosen in the belief that a recalled ready reservist who could perform CTR job tasks competently at the E-4 level would make a positive work contribution to a receiving unit.

The CTR-3 job task statements were used on questionnaires mailed to IRR and active duty personnel. Information sought concerned tasks performed and the level of competency attached to the performance of each. Level of competency was defined in terms of the amount of supervision needed to perform specific job tasks.

Questionnaires mailed to IRR personnel requested information about proficiency on each job task at the End of Active Obligated Service (EAOS) and at the present time (NOW). The difference between proficiency at EAOS and current proficiency would reflect skill deterioration during IRR membership.

Questionnaires mailed to active duty CTR-3s requested information about current proficiency on job tasks and proficiency expected after 2 years of nonperformance of the job tasks. The current proficiency estimates were needed to define criterion job performance for an active duty CTR-3. The data reflecting what is currently done on the job would define an acceptable level of performance. These data could be used as a baseline for judging amount and consequences of IRR skill deterioration. Copies of these data collection instruments are shown in the next section.

As of 10 December 1984, 865 CTRs were listed in Naval Military Personnel Command (NMPC) computer files as assigned to the IRR. Names and addresses were obtained from NMPC through the Naval Reserve Personnel Center (NRPC). Questionnaires were mailed under CNO (OP-11) cover letter on 21 February 1985 to a random sample of 500 (61 percent). Coordination with the Commander, Naval Security Group (COMNAVSECGRU) had previously been accomplished. Because of a low initial return rate, a follow-up mailing (336) was made on 8 April 1985. Questionnaire returns were accepted until 24 May 1985.

Coordination with Commander in Chief, U.S. Atlantic Fleet (CINCLANTFLT), Commander in Chief, U.S. Pacific Fleet (CINCPACFLT), COMNAVSECGRU, and within CNO (OP-01) was accomplished for authorization to survey active duty CTR-3 personnel. A CTR-3 roster, current as of 2 August 1985, was obtained from NMPC. From a pool of 422, a sample of 271 CTR-3s was determined using accepted survey research methods. Questionnaires were mailed on 18 September 1985 under CNO (OP-11) cover letter to unit/activity commanding officers for distribution to CTR-3s named. Returns were accepted until 31 December 1985. Returned questionnaires were scanned to determine data usability, and data were entered into computer files. Subsequently, summaries of the information of interest to the study were prepared.

Unfortunately, questionnaires intended for CTR active duty personnel were inadvertently mailed to active duty Cryptologic Technician (Technical) (CTT) personnel. Because of rating job similarities, much of the data were still usable and are appropriately reported.

RESULTS

Results pertinent to the assessment of CTR skill deterioration are presented in this section.

QUESTIONNAIRE RETURN STATISTICS

Table D-7-1 shows, for both the IRR and active duty CTRs, the number of questionnaires mailed and number and percent of usable returns. For the IRR sample, the number/percent of nonvalid returns (nonvalid principally because of data base errors) is also shown. Percent usable returns was derived by dividing the number returned (91) by the number delivered (i.e., 500 - 153 = 347).

Table D-7-1

Questionnaire Return Statistics

Sample	No. Mailed	Usable Returns No.	Usable Returns %	Nonvalid No.	Nonvalid %
IRR	500	91	26	153	30.6
Active Duty	271	177	65		

QUESTIONNAIRE DATA SUMMARIES

Summaries of data obtained from the questionnaires are presented in table D-7-2 for IRR personnel and in tables D-7-3a and D-7-3b for active duty personnel. The tables are modified questionnaire forms.

The data presented in table D-7-3a are from active duty CTT personnel. As mentioned, the CTR questionnaire was inadvertently mailed to CTTs. This table shows how CTTs responded to CTR tasks. It is presented for information only. The data are not used in subsequent analyses to assess skill deterioration or training needs.

The data given in table D-7-3b are from active duty CTRs. Data are available for only six tasks, however. These tasks were common to both CTTs and CTRs and were included on both questionnaires.

Background Questions

Of 91 IRR CTRs answering the question, 10 (approximately 11 percent) reported that they now work in a civilian occupation related to their Navy CTR rating. Answers to the remaining two background questions for IRRs (see table D-7-2) are not reported since it was determined that the answers might be redundant and could not be unambiguously interpreted. Of the active duty respondents answering the background questions (see table D-7-3b), 159 of 175 (90.9 percent) work in rating. One hundred and fifty-nine (92 percent) are assigned sea duty.

Table D-7-2

Overall Summary of CTR IRR Questionnaire Data

PART 1:

1. If necessary, correct your Service Number.
2. Is the work which you do NOW related to your Navy rating?
   Yes 10 No 81
3. Have you done PREVIOUS work which is related to your Navy rating since your Expiration of Active Obligated Service (EAOS)?
   Yes - No -
4. Have you received training related to your Navy rating since your Expiration of Active Obligated Service (EAOS)?
   Yes - No -

ANSWER KEY:

(1) Have never performed the task.

(2) Can/could do simple parts of the task (need direct supervision).

(3) Can/could do most parts of the task (need general supervision).

(4) Can/could do all parts of the task (need only occasional supervision. Meets minimum local speed and accuracy standards.)

(5) Can/could do complete task quickly and accurately (need no supervision).

PART 2:

For each job task statement below:

A. Indicate your CURRENT level of ability according to the answer key above.

B. Estimate your PREVIOUS level of ability at the time of your EAOS according to the answer key above.

"(1)" Choices				A			B		
F	%		Tasks	N	Mean	SD	N	Mean	SD
17	19.1	1.	Perform basic analysis using publications and working aids.	91	2.65	1.214	89	3.62	1.585
27	30.7	2.	Identify MIJI (Meaconing, Interference, Jamming, and Intrusion) signals.	90	2.47	1.432	88	3.23	1.727
3	3.4	3.	Properly account for, handle, stow, and destroy classified material.	89	3.75	1.255	87	4.35	1.076
1	1.1	4.	Perform Morse code collection duties; recognize common non-Morse and R/T selections.	91	3.53	1.268	89	4.51	.919
7	8.0	5.	Recognize and report CRITIC activity.	90	2.99	1.302	88	4.07	1.294
3	3.4	6.	Operate and calibrate the R-390.	91	3.81	1.349	89	4.57	.999
50	58.1	7.	Operate and calibrate the R-2174.	87	1.93	1.388	86	2.31	1.689

Table D-7-2 (Continued)

62	71.3	8. Operate and calibrate the SSQ 80 suite.	87	1.51	.975	87	1.87	1.495
29	33.0	9. Operate computer-based collection systems.	89	2.52	1.478	88	3.18	1.726
32	37.2	10. Perform FLAG and TAG functions IAW IATS COPES requirements.	89	2.15	1.319	86	2.93	1.741
30	34.9	11. Use SCOL card data to intercept appropriate target.	88	2.49	1.539	86	3.15	1.786
		12. I can/could copy Morse code.	77	17g/m	8.549	88	30g/m	10.15
		Overall Mean:		2.68				

Table D-7-3a

Overall Summary of CTR Active Duty Questionnaire Data

PART 1:

1. If necessary, correct your Service Number.
2. Does your current billet require you to work in your Navy rating?
   Yes 159 No 16
3. What type duty is your current billet?
   Sea 159 Shore 14

ANSWER KEY:

(1) Have never performed the task.

(2) Can/could do simple parts of the task (need direct supervision).

(3) Can/could do most parts of the task (need general supervision).

(4) Can/could do all parts of the task (need only occasional supervision. Meets minimum local speed and accuracy standards.)

(5) Can/could do complete task quickly and accurately (need no supervision).

PART 2:

For each job task statement below:

A. Use the answer key above to indicate your CURRENT level of ability.

B. Use the answer key above to estimate your EXPECTED level of ability after 2 years of not performing these tasks.

"(1)" Choices				A			B		
F	%		Tasks	N	Mean	SD	N	Mean	SD
23	13.1	1.	Perform basic analysis using publications and working aids.	176	3.79	1.372	174	2.96	1.155
102	58.0	2.	Identify MIJI (Meaconing, Interference, Jamming, and Intrusion) signals.	176	2.10	1.431	170	1.93	1.195
5	2.8	3.	Properly account for, handle, stow, and destroy classified material.	176	4.19	1.024	174	3.66	1.121
25	14.2	4.	Perform Morse code collection duties; recognize common non-Morse and R/T selections.	176	3.37	1.359	173	2.68	1.185
40	22.6	5.	Recognize and report CRITIC activity.	177	3.18	1.488	172	2.67	1.229
15	8.5	6.	Operate and calibrate the R-390.	176	3.72	1.331	174	3.08	1.251
100	57.1	7.	Operate and calibrate the R-1174.	175	2.39	1.731	170	2.20	1.502

Tale D-7-3a (Continued)

146	83.0	8.	Operate and calibrate the SSQ 80 suite.	176	1.34	.839	167	1.40	.865
21	12.0	9.	Operate computer-based collection systems.	175	3.96	1.383	171	3.28	1.223
131	74.9	10.	Perform FLAG and TAG functions IAW IATS COPES requirements.	175	1.65	1.263	168	1.58	1.017
147	84.5	11.	Use SCOL card data to intercept appropriate target.	174	1.43	1.088	165	1.44	1.008
		12.	I can/could copy Morse code.						

Table D-7-3b

Overall Summary of Available CTR Active Duty Questionnaire Data

PART 1:

1. If necessary, correct your Service Number.
2. Does your current billet require you to work in your Navy rating?
   Yes 159 No 16
3. What type duty is your current billet?
   Sea ____ Shore ____

ANSWER KEY:

(1) Have never performed the task.

(2) Can/could do simple parts of the task (need direct supervision).

(3) Can/could do most parts of the task (need general supervision).

(4) Can/could do all parts of the task (need only occasional supervision. Meets minimum local speed and accuracy standards.)

(5) Can/could do complete task quickly and accurately (need no supervision).

PART 2:

For each job task statement below:

A. Use the answer key above to indicate your CURRENT level of ability.

B. Use the answer key above to estimate your EXPECTED level of ability after 2 years of not performing these tasks.

"(1)" Choices				A			B	
F	%	Tasks	N	Mean	SD	N	Mean	SD
27	17.3	1. Perform basic analysis using publications and working aids.	156	3.53	1.439	150	2.86	1.253
19	12.3	2. Identify MIJI (Meaconing, Interference, Jamming, and Intrusion) signals.	155	3.52	1.350	148	2.89	1.196
6	3.8	3. Properly account for, handle, stow, and destroy classified material.	157	4.23	1.067	151	3.57	1.219
8	5.2	4. Perform Morse code collection duties; recognize common non-Morse and R/T selections.	155	4.03	1.101	148	3.32	1.229
14	9.0	5. Recognize and report CRITIC activity.	156	3.71	1.276	150	3.09	1.300
-	-	6. Operate and calibrate the R-390.						
-	-	7. Operate and calibrate the R-1174.						

Table D-7-3b (Continued)

-	-	8. Operate and calibrate the SSQ 80 suite.						
18	11.5	9. Operate computer-based collection systems.	156	3.74	1.330	147	3.12	1.255
-	-	10. Perform FLAG and TAG functions IAW IATS COPES requirements.						
-	-	11. Use SCOL card data to intercept appropriate target.						
		12. I can/could copy Morse code.						

Task Performance Data

The data summary tables (D-7-2 and D-7-3b) show the number (F) and percent (%) of respondents reporting that they had never performed particular job tasks (i.e., they responded to the task description with a "1.") For IRRs, these data refer to the "at EAOS" answers and for active duty to the current (NOW) level of ability.

Tables D-7-2 and D-7-3b also show, for each task listed on a questionnaire, mean values for performance proficiency/competency, the standard deviation (SD) around the mean, and the number of cases (n) on which a mean is based. For the IRR sample, table D-7-2, the "A" column reflects current average ability level; the "B" column, EAOs average ability level. For the active duty sample (table D-7-3b), the "A" column refers to current (NOW) ability and the "B" to proficiency expected after 2 years of nonperformance of a task.[1]

For the IRR group, an overall grand mean for current proficiency was computed over all tasks for the rating. This single number indicates that considering the CTR-3 job in its entirety (as reflected by the tasks used) the average IRR member feels that he could now perform most tasks of the rating at a level where general supervision would be needed (mean = 2.7).

For the active duty group, means reflecting proficiency on each job task for CTRs working/not working in their rating were computed. These are shown in table D-7-4. Again, the expected-after-2-years data are provided for information only.

SKILL DETERIORATION

Table D-7-5 displays task proficiency means for two subgroups of the CTR IRR respondents: (1) those who answered that they were now working ("W") in a field related to the Navy CTR rating and (2) those who indicated that they were not working ("N") in a related field. Both EAOS and NOW (current) proficiency means are given. These means, as well as those in table D-7-4, were computed from choices of 2, 3, 4, or 5 from the answer key. These choices place proficiency along a continuum from "Need direct supervision" through "Need no supervision."

As mentioned earlier, skill deterioration is reflected by differences between EAOS proficiency and NOW proficiency. In table D-7-5, values preceded by a minus sign represent a decrease in proficiency during IRR membership: current proficiency is less than EAOS proficiency. Values with no signs indicate increases in proficiency.

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[1] These expected-after-2-years proficiency values were not used in subsequent analyses, however, since it was clear that many respondents did not understand the question being asked.

Table D-7-4

Available Task Mean Values for Two Subgroups of Active Duty CTRs

	Not Working ("N")[1]		Working ("W")[2]	
Task	NOW	EXP	NOW	EXP
1	4.286	3.571	4.034	3.200
2	3.714	3.000	3.865	3.157
3	4.625	3.625	4.350	3.746
4	4.429	3.429	4.168	3.488
5	4.250	3.750	3.962	3.380
6	-	-	-	-
7	-	-	-	-
8	-	-	-	-
9	4.250	3.250	4.102	3.496

Composite Mean:* Group W NOW
EXP
Group N NOW
EXP

Overall Mean:* NOW
EXP

*These values were not computed for this rating.

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[1] n = 8
[2] n = 147

Table D-7-5

Task Mean Values for Two Subgroups of IRR CTRs

	Not Working ("N")[1]		Working ("W")[2]		Mean Difference	
Task	NOW	EAOS	NOW	EAOS	"N"	"W"
1	3.100	4.317	3.400	3.667	-1.217	-0.267
2	3.327	4.222	3.250	4.143	-0.895	-0.893
3	3.787	4.473	4.600	4.400	-0.686	0.200
4	3.600	4.513	4.500	4.800	-0.913	-0.300
5	3.194	4.310	4.200	4.500	-1.116	-0.300
6	3.959	4.658	4.700	5.000	-0.699	-0.300
7	3.226	4.061	5.000	5.000	-0.835	0.000
8	2.762	3.957	3.333	5.000	-1.195	-1.667
9	3.396	4.278	3.857	4.000	-0.882	-0.143
10	3.071	4.083	3.500	4.000	-1.012	-0.500
11	3.478	4.260	3.833	4.667	-0.782	-0.834

Composite Mean:	Group W	NOW	4.016
		EOS	4.471
	Group N	NOW	3.355
		EOS	4.285
Overall Mean:		NOW	3.685
		EOS	4.378

[1] n = 81

[2] n = 10

195

The table shows that CTRs who now work ("W") in a field related to their former active duty jobs lost proficiency on 9 or 11 job tasks. This group also reported less skill deterioration over most other rating tasks than the "N" subgroup. Statistical tests (t tests for independent means; see Guilford and Fruchter, 1973) indicated that over all tasks of the CTR rating the proficiency of the two subgroups was equivalent at EAOS ($t = 1.20$, $p < .1213$). Task mean proficiency values differed significantly ($t = 3.11$, $p < .0028$) on current (NOW) proficiency.

TIME IN IRR

Table D-7-6 provides a breakdown of CTR personnel by time spent in the IRR prior to mail out of the questionnaires. The table also shows mean values assigned for proficiency for 6-month intervals of IRR time and for IRRs off active duty more than 3 years. These mean values are shown for information only, since the number of individuals in each group is too small to permit meaningful quantitative interpretation.

Table D-7-6

Mean Proficiency Values for CTR IRR Respondents by Time Since EAOS

Time (Mos.) Since EAOS	Mean	No. of Cases
0-5	1.97	7
6-11	-	-
12-17	-	-
18-23	-	-
24-35	3.12	7
36+	2.71	66
Overall Mean	2.68	80

COMMENTS AND OBSERVATIONS

Comments and observations on the data are offered here. As warranted, interpretations are made and discussed. These interpretations provide the basis for certain conclusions about skill deterioration and retraining needs. Our conclusions are based on best available data. However, they are subject to validation. The low questionnaire return rate coupled with the uncertain quality of the IRR data base (discussed below) require cautious inferences and limit generalizations. Nevertheless, the results do provide much useful information about the IRR that has not been available previously. They also suggest directions that should be taken with respect to the management and utilization of the IRR resource.

COMMENTS ON DATA BASE

Approximately 31 percent of questionnaires returned were classified as "nonvalid" (table D-7-1). This category reflects probable errors in the IRR data base. The nonvalid category included, most prominently, questionnaires returned by the Postal Service as undeliverable (bad addresses). It also included, but to a much smaller extent, questionnaires returned by respondents with comments such as: "No longer in IRR, returned to active duty, already received final discharge. Retiree recruited from another service, was never on active duty in the Navy." (All information concerning such cases was transmitted to the Naval Reserve Personnel Center on 26 September 1985). Finally, a very few questionnaires were returned by individuals who refused to provide information and, some, by relatives marked, "Deceased." From the above data, it can be concluded that about 31 percent of the CTR IRRs could not or would not be available for mobilization.

Questionnaires were presumably delivered by the Postal Service to a number of CTRs (74 percent) from whom no information was received. It is likely that many did not respond for reasons such as those cited above--they felt the questionnaire was not applicable. A further group, of unknown size, then would also be unavailable for mobilization because they are not in the viable IRR manpower pool as is currently believed. These considerations prompt a recommendation for review and validation of the CTR IRR roster.

Another data base issue that should be examined concerns the amount of time that CTR respondents have been away from active duty. This information is given in table D-7-6. Nearly 83 percent were in the IRR for more than 3 years. Two issues emerge: (1) the need for skill upgrading and (2) availability of IRR members. Upgrade training because of new equipment, procedures, or material may be required for this group. CTR SMEs must make this determination, however, based on changes to how the job is now performed.

A second consideration concerns the military service obligation (MSO). Those who are liable for a 6- or 8-year MSO (depending on when they entered on active duty) may be involuntarily recalled. Those who are beyond the MSO may only be recalled under existing agreements. If these agreements do not exist, still fewer individuals may be actually recallable for mobilization. The size of the available IRR manpower pool may be overestimated. Again, the recommendation is made that this data base be reviewed and validated if this is not already occurring. This should include an attempt to determine why so few CTRs were in the IRR group separated less than 3 years.

SKILL DETERIORATION

Information directly pertinent to the question of skill deterioration was presented in table D-7-5. In table D-7-5, differences between mean values at EAOS and NOW (current proficiency) are shown. Values preceded by a minus sign represent skill deterioration potentially attributable to time spent in the IRR.

Approximately 11 percent of CTR IRRs reported that they now work in a civilian occupation related to the CTR rating and the effects of this work experience on skill deterioration will be considered next. As table D-7-5 shows, CTRs who now work in a field related to their Navy rating gained proficiency on one job task. This "W" subgroup also reported less skill deterioration than the "N" subgroup for 7 of the other 11 CTR job tasks. Taken over all tasks, differences between the current (NOW) proficiency means for the two subgroups were statistically significant. Also, they could not be attributed to initial differences between the groups at EAOS. Thus, civilian CTR-related employment significantly affected skill deterioration. Those continuing to work in the CTR field after EAOS reported less deterioration. The tasks on which the greatest amount of skill deterioration occurred are easily identifiable from table D-7-5.

TRAINING NEEDS

While skill deterioration information is of interest in its own right, the more important concern of this study is with determining the need for training IRR personnel prior to mobilization. Thus, the implications of skill deterioration data must be assessed against the criterion of acceptable level of proficiency. This can be done most directly by comparing the current proficiency levels reported by CTR IRRs against the levels reported by active duty CTR-3s. The task means for the active duty sample can be taken as E-4 criterion performance since they reflect the level of proficiency claimed by the average CTR-3 now on active duty.

The meaning of specific numerical values reported for task means must be clearly understood before conclusions about skill deterioration or training needs can be addressed. Attention is directed to the "answer key" shown on either table D-7-2 or D-7-3. The answer key shows that a value of "4," for example, represents skilled performance with only a need for occasional supervision. Following conventional practice, we assume that a "4" is reflected by any values between 3.50 and 4.49. A "3" is interpreted similarly. Skill deterioration may be shown by lower mean values for NOW (i.e., current) versus EAOS proficiency. However, the change from EAOS scores may not be sufficient to move the IRR respondents to a lower proficiency category. For example, skill loss on tasks 9 to 11 occurred for the IRRs working in a related field. However, the losses reported resulted in the IRRs remaining in the "4" category (see table D-7-5). We would conclude that the deterioration is of no consequence insofar as signaling a need for retraining.

Assessment of the need for training IRR personnel to support mobilization should proceed with the application of similar logic. Table D-7-7 below presents the task mean values reported for current proficiency by IRR personnel who are not working in a field related to the CTR rating and also for those who are. These values are from table D-7-5. Task proficiency means for active duty personnel working in their rating (taken from table D-7-4) are also shown in table D-7-7. Inspection of the data shows that 8 of the 11 job tasks are essentially "4"s for IRR CTRs working in a related field. For IRR CTRs not working in a related field, 4 of the 11 job tasks are "4"s. Hence, from these data alone, a fair conclusion is that training of CTR IRRs working in a related field would not be required before mobilization to bring proficiency to an acceptable level. On the other hand, training of CTR IRRs not working in a related field would be recommended before mobilization.

From our assessment, there is no apparent need for extensive retraining or maintenance training of CTRs now working in the field. The data indicate that the average IRR CTR in this category should be able to perform required job tasks at an appropriate level of competency with a modicum of refamiliarization at mobilization. The picture is different for CTR IRRs not working in the field. The average IRR CTR can not be expected to be able to perform required job tasks at mobilization. Due to the nature of the CTR job, tasking should be issued to the appropriate CT community to develop a specialized premobilization curriculum for the rating.

Table D-7-7

Task Mean Proficiency Values for IRR and Active Duty CTRs

	IRR		Active Duty
Tasks	Not in Field	In Field	In Rating
1	3.1*	3.4*	4.0
2	3.3*	3.3*	3.9
3	3.8	4.6	4.4
4	3.6	4.5	4.2
5	3.2*	4.2	4.0
6	4.0	4.7	-
7	3.2*	5.0	-
8	2.8*	3.3*	-
9	3.4*	3.9	4.1
10	3.1*	3.5	-
11	3.5	3.8	-

*Probable training needs.

For a number of reasons, even though the data reviewed above might indicate otherwise, we would also recommend formal refresher training for the CTRs who are working in jobs related to their rating. These reasons stem from the intrinsic nature of the CTR job and the limitations of most civilian employment for providing practice opportunities on the many aspects of this job. For those relatively few IRR CTRs who are in civilian jobs related to the rating, training requirements would certainly be less than for the remaining IRRs.

Any premobilization curriculum developed for CTRs should consider the findings of research literature that reacquisition of lost skills requires about one-half the time required to acquire these skills originally. Also, a premobilization curriculum should be flexible enough to accommodate specific training needs of individual CTRs. The tasks identified in table D-4-7 should be appropriately emphasized in the curriculum. Training for both basic and operational skills must be considered.

An additional factor to consider in assessing needs for training concerns time since EAOS. Almost 83 percent of the CTR IRRs in the sample were away from active duty for more than 3 years (see table D-7-6). Subject matter experts who review the data provided here may determine that skill upgrade training is required because of technical changes (e.g., new equipment, materials, procedures) in the field. These needs could also be incorporated into a specialized curriculum.

VALIDATION OF DATA

Our analyses indicate that there is a need for training CTR IRRs to support mobilization. Formal refresher training appears to be the best solution. In some cases, instructional modules for training prospective CTR returnees on given individual tasks may suffice. Information not readily available to the project staff is needed, however, for firm decisions about the need for training to bring prospective IRR returnees to an acceptable level of proficiency or to maintain their skills at a defined level. We recommend that the information provided by this report be evaluated/validated against a number of other considerations. Resource sponsors would be appropriate to validate training needs.

Data Review

As noted previously, the conclusions generated by the project staff are considered tentative and subject to verification. Generalizations from the data have also been limited because of the small numbers of questionnaires returned and because of suspected IRR data base inadequacies. It is believed, however, that much useful information can be gleaned from the descriptive summaries provided. Most of this information has not previously been available because of the many difficulties inherent in conducting skill deterioration research and restrictions on methods that can be used because of practical considerations. Maximum exploitation of the information that is now available is in order. A complete and accurate assessment of the meaning and action implications of the data should be made by individuals who are thoroughly knowledgeable of technical requirements of the CTR rating. The NAVTRASYSCEN, if requested, could assist SMEs in this effort. Areas to be considered in the review/validation process are discussed next.

Review Areas

For our study, SMEs from the Naval Technical Training Center, Corry Station, Pensacola, FL, identified the job tasks they thought would be appropriate for returning IRR CTR members to perform. Other SMEs may not agree on the list. Resource sponsors should determine if these are indeed the job tasks that an IRR returnee (at mobilization) should be able to perform. Further, a companion decision is required concerning the acceptability of the reported level of competency. Since active duty personnel report that they, on the average, now perform at these levels, these data reflect E-4 criterion performance. Resource sponsors should consider whether less proficiency would be acceptable. If so, attendant training requirements for IRRs with concomittant resource requirements would be lessened. On judging the need for training, task criticality, in terms of personnel or equipment safety, or mission success, as it interacts with recent changes to material, procedures, or equipment, must also be considered.

An additional decision factor concerns plans for utilization of IRR personnel at mobilization. If these individuals will serve as casualty replacements, then a fairly high level of proficiency at recall is desirable. Training, as determined by the study data and by the resource sponsor, should occur prior to recall. If, however, IRR members will replace current active duty personnel in less demanding assignments, then time would be available for receiving units or some especially chartered intermediate activity to provide needed training.

CONCLUSIONS

1. Mobilization planners should be aware that the size of the CTR IRR manpower pool may be smaller than believed. Approximately 31 percent of the pool may not be contactable by mail. An additional segment of unknown size may have already reenlisted and/or not be useful to the Navy for other reasons. A substantial percentage of CTRs listed in IRR files could also be beyond the zone of involuntary recall.

2. CTR IRR personnel who work in civilian occupations related to their rating report less deterioration of skills than CTRs who are not similarly employed. This group should be considered for first recall priority.

3. Retraining for all CTRs, regardless of civilian occupation, appears necessary to support mobilization. Formal refresher training prior to recall appears to offer the best solution to training needs. This conclusion is subject to concurrence by subject matter expert CTRs.

4. Periodic maintenance training, after refresher training, would guard against future unwanted erosion of skills.

5. CTR personnel off active duty for greater than 3 years will probably require training on selected tasks to update skills.

RECOMMENDATIONS

1. Review, update, and validate the IRR data base content to assure that accurate assessments of the size of the IRR manpower pool are available at all times. Take whatever other steps are necessary and available to assure continuous updating of the data base.

2. Amend existing procedures where possible to obtain information

from IRR members concerning civilian employment. At the very least, obtain this information from those eligible for or receiving bonuses for continued IRR service. Consider these individuals as first choice for mobilization recall.

3. Request resource sponsors review the data of this study. Determine if agreement can be reached that the tasks generated by schoolhouse SMEs adequately represent the CTR-3 job. Determine that the CTR-3 job is, in fact, acceptable as the target performance level for training to support mobilization. Request resource sponsors to consider the data of this study against factors such as changes to materials, procedures, equipment used by the rating, criticality of task performance, and mobilization plans for IRR personnel. Request resource sponsors determine the validity of data provided.

4. Issue appropriate tasking, if the conclusions of this study are accepted, to develop a specialized premobilization curriculum for refreshing basic skills, and refreshing and updating operational skills.

5. Task the NAVTECHTRACEN, Corry Station, to develop or assist development of a premobilization curriculum for CTR IRRs and a skill maintenance curriculum.

6. Recall a sample of CTR IRRs to assess their knowledge of current CTR-3 job requirements. Use this information to validate the data and conclusions of this study.

APPENDIX D

ANNEX 8

CRYPTOLOGIC TECHNICIAN (TECHNICAL) (CTT): SKILL DETERIORATION DURING NAVY INDIVIDUAL READY RESERVE (IRR) MEMBERSHIP

INTRODUCTION

Following a first-tour of active duty, Naval personnel who do not elect other reserve options are assigned to the Individual Ready Reserve (IRR) to complete a specified Military Service Obligation (MSO); other personnel may voluntarily enlist in the IRR. IRR members, typically in a nonpay, nondrill status, are subject to recall to active duty if mobilization of the Armed Forces is ordered. A major concern of mobilization planners is that the skills acquired on active duty may deteriorate over time under the IRR condition of nonuse. This raises the question of the contribution that can be made by recalled IRR service members. To determine the extent and nature of skill deterioration during IRR membership, the Naval Training Systems Center (NAVTRASYSCEN), Code 10, conducted an assessment study. The study was performed at the request of the Chief of Naval Operations (OP-01R1).

This study assessed skill deterioration for 16 critical Navy ratings identified by OP-01. The designation "critical" was based on the criterion of projected personnel shortfalls for mobilization. The Cryptologic Technician (Technical) (CTT) rating was one of these 16.

PURPOSE OF THE STUDY

The purpose of the study was to assess skill deterioration during IRR membership and determine needs for training IRR personnel to restore, upgrade, or maintain their skills at minimum proficiency levels to support mobilization. Implicit in the tasking was the additional requirement to define minimum, or acceptable, proficiency.

In a general sense, acceptable proficiency refers to the ability of a recalled ready reservist to make an effective contribution to a receiving unit's mission. In a more specific sense, it refers to ability to perform a defined set of job tasks at a defined level of competency. Performance proficiency information was essential to establish a baseline around which obtained skill deterioration information could be assessed and to define the terminal performance goals that any proposed training regimen should attempt to achieve.

APPROACH

Complete details of the technical approach to the study are presented in the main body of this report. A brief description is presented here.

Mail-out questionnaires were used to obtain information. Six senior enlisted CTTs, assigned to the Naval Technical Training Center, Corry Station, Pensacola, FL, served as subject matter experts (SME) for questionnaire development. Under guidance given by the project staff, the CTT SMEs selected from various source materials a set of job tasks that, in their judgment, best represented the job (non-NEC specific) of an active duty CTT-3. This level was chosen in the belief that a recalled ready reservist who could perform CTT job tasks competently at the E-4 level would make a positive work contribution to a receiving unit.

The CTT-3 job task statements were used on questionnaires mailed to IRR and active duty personnel. Information sought concerned tasks performed and the level of competency attached to the performance of each. Level of competency was defined in terms of the amount of supervision needed to perform specific job tasks.

Questionnaires mailed to IRR personnel requested information about proficiency on each job task at the End of Active Obligated Service (EAOS) and at the present time (NOW). The difference between proficiency at EAOS and current proficiency would reflect skill deterioration during IRR membership.

Questionnaires mailed to active duty CTT-3s requested information about current proficiency on job tasks and proficiency expected after 2 years of nonperformance of the job tasks. The current proficiency estimates were needed to define criterion job performance for an active duty CTT-3. The data reflecting what is currently done on the job would define an acceptable level of performance. These data could be used as a baseline for judging amount and consequences of IRR skill deterioration. Copies of the data collection instruments are shown in the next section.

As of 10 December 1984, 657 CTTs were listed in Naval Military Personnel Command (NAVMILPERSCOM) computer files as assigned to the IRR. Names and addresses were obtained from NAVMILPERSCOM through the Naval Reserve Personnel Center (NAVRESPERSCEN). Questionnaires were mailed under CNO (OP-11) cover letter on 22 February 1985 to a random sample of 499 (76 percent). Coordination with the Commander, Naval Security Group (COMNAVSECGRU) had previously been accomplished. Because of a low initial return rate, a follow-up mailing (342) was made on 8 April 1985. Questionnaire returns were accepted until 24 May 1985.

Coordination with Commander in Chief, U.S. Atlantic Fleet (CINCLANTFLT), Commander in Chief, U.S. Pacific Fleet (CINCPACFLT), COMNAVSECGRU, and within CNO (OP-01) was accomplished for authorization to survey active duty CTT-3 personnel. A CTT-3 roster, current as of 2 August 1985, was obtained from NAVMILPERSCOM. From a pool of 364, a sample of 271 CTT-3s was determined using accepted survey research methods. Questionnaires were mailed on 18 September 1985 under CNO (OP-11) cover letter to unit/activity commanding officers for distribution to CTT-3s named. Returns were accepted until 31 December 1985. Returned questionnaires were scanned to determine data usability, and data were entered into computer files. Subsequently, summaries of the information of interest to the study were prepared. Unfortunately, questionnaires intended for CTT active duty personnel were inadvertently mailed to active duty Cryptologic Technicians (Collection) (CTR). Because of rating job similarities, much of the data were still usable and are appropriately reported.

RESULTS

Results pertinent to the assessment of CTT skill deterioration are presented in this section.

QUESTIONNAIRE RETURN STATISTICS

Table D-8-1 shows, for both the IRR and active duty CTTs, the number of questionnaires mailed and number and percent of usable returns. For the IRR sample, the number/percent of nonvalid returns (nonvalid principally because of data base errors) is also shown. Percent usable returns was derived by dividing the number returned (98) by the number delivered (i.e., 499 - 138 = 361).

Table D-8-1

Questionnaire Return Statistics

Sample	No. Mailed	Usable Returns No.	Usable Returns %	Nonvalid No.	Nonvalid %
IRR	499	98	27	138	28
Active Duty	271	158	58		

QUESTIONNAIRE DATA SUMMARIES

Summaries of data obtained from the questionnaires are presented in table D-8-2 for IRR personnel and in tables D-8-3a and D-8-3b for active duty personnel. The tables are modified questionnaire forms.

The data presented in table D-8-3a are from active duty CTR personnel. As mentioned, the CTT questionnaire was inadvertently mailed to CTRs. This table shows how the CTRs responded to CTT tasks. It is presented for information only. These data are not used in subsequent analyses to assess skill deterioration or training needs.

The data given in table D-7-3b are from active duty CTTs. Data are available for only six tasks, however. These tasks were common to both CTTs and CTRs and were included on both questionnaires.

Background Questions

Of 94 IRR CTTs answering the question, 27 (approximately 29 percent) reported that they now work in a civilian occupation related to their Navy CTT rating. Answers to the remaining two background questions for IRRs (see table D-8-2) are not reported since it was determined that the answers would be somewhat redundant and could not be unambiguously interpreted. Of the active duty respondents answering the background questions (see table D-8-3b), 147 of 155 (94.8 percent) work in rating. One hundred thirty-eight (88.5 percent) are assigned shore duty.

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Table D-8-2

Overall Summary of CTT IRR Questionnaire Data

PART 1:	ANSWER KEY:
1. If necessary, correct your Service Number.	(1) Have never performed the task.
2. Is the work which you do NOW related to your Navy rating? Yes 27 No 67	(2) Can/could do simple parts of the task (need direct supervision).
3. Have you done PREVIOUS work which is related to your Navy rating since your Expiration of Active Obligated Service (EAOS)? Yes - No -	(3) Can/could do most parts of the task (need general supervision).
	(4) Can/could do all parts of the task (need only occasional supervision. Meets minimum local speed and accuracy standards.)
4. Have you received training related to your Navy rating since your Expiration of Active Obligated Service (EAOS)? Yes - No -	(5) Can/could do complete task quickly and accurately (need no supervision).

PART 2:

For each job task statement below:

A. Indicate your CURRENT level of ability according to the answer key above.

B. Estimate your PREVIOUS level of ability at the time of your EAOS according to the answer key above.

"(1)" Choices				A			B	
F	%	Tasks	N	Mean	SD	N	Mean	SD
19	19.8	1. Select antennas and transmission lines.	97	2.87	1.397	96	3.65	1.596
9	9.5	2. Identify RF interference.	95	3.28	1.456	95	4.02	1.337
6	6.3	3. Classify radio signal, modulation, and keying method; determine bandwidth.	97	3.07	1.210	96	4.05	1.217
5	5.2	4. Perform external analysis of signals using publications and working aids.	97	3.43	1.282	96	4.38	1.117
6	6.3	5. Process and service mission-related materials.	96	3.19	1.217	95	4.30	1.166
4	4.2	6. Account for, handle, stow, transmit and destroy classified material.	96	3.72	1.303	96	4.50	1.026

Table D-8-2 (Continued)

3	3.1	7. Prepare magnetic recordings and care for magnetic tapes.	97	4.18	1.216	96	4.73	.814
3	3.1	8. Identify non-Morse signals and terms.	97	3.32	1.263	96	4.32	1.021
30	31.6	9. Identify MIJI (Meaconing, Interference, Jamming and Intrusion) signals.	97	2.24	1.297	95	2.87	1.538
25	26.3	10. Identify and classify ELINT and ELSEC signals and terms.	96	2.47	1.376	95	3.38	1.683
50	52.1	11. Calculate maximum and minimum range and range resolution of radars.	97	1.90	1.262	96	2.26	1.517
49	51.6	12. Identify radar fingerprinting applications.	96	1.90	1.294	95	2.43	1.680
50	53.2	13. Read and use SEDSCAF.	96	1.85	1.256	94	2.29	1.556
28	30.1	14. Perform tactical reporting.	96	2.44	1.352	93	3.29	1.704
19	19.8	15. Recognize and report CRITIC.	95	2.59	1.317	96	3.59	1.553
12	12.9	16. Operate computer-based systems.	93	3.61	1.344	93	3.77	1.430
4	4.2	17. Operate receiving and peripheral equipment and perform operator functions; detect malfunctions.	97	3.38	1.220	96	4.31	1.108
4	4.2	18. Interpret functions of the NAVSECGRU; interpret SI security classification designations and categories.	97	3.23	1.262	96	4.28	1.073
7	7.4	19. Use on-line and off-line analysis equipment and produce visual and graphic displays to aid in identifications of system characteristics.	95	3.13	1.265	95	4.20	1.199
36	38.3	20. Prepare for and perform fleet direct support operations.	96	2.24	1.328	94	2.90	1.704
12	12.8	21. Prepare routine technical reports.	96	3.23	1.349	94	3.94	1.435
27	28.1	22. Identify classes of ships, aircraft, and missiles.	97	2.35	1.283	96	2.98	1.569
13	13.8	23. Identify categories of SIGINT alerts.	94	2.60	1.221	94	3.45	1.396
		24. I can/could type.	88	33wpm	15.765	91	36wpm	17.819
		25. I can/could copy Morse code.	72	70g/m	6.918	83	17g/m	11.388
		Overall Mean:		2.89				

Table D-8-3a

Overall Summary of CTT Active Duty Questionnaire Data

PART 1:

1. If necessary, correct your Service Number.
2. Does your current billet require you to work in your Navy rating?
   Yes ____ No _8_
3. What type duty is your current billet?
   Sea _138_ Shore _18_

ANSWER KEY:

(1) Have never performed the task.

(2) Can/could do simple parts of the task (need direct supervision).

(3) Can/could do most parts of the task (need general supervision).

(4) Can/could do all parts of the task (need only occasional supervision. Meets minimum local speed and accuracy standards.)

(5) Can/could do complete task quickly and accurately (need no supervision).

PART 2:

For each job task statement below:

A. Use the answer key above to indicate your CURRENT level of ability.

B. Use the answer key above to estimate your EXPECTED level of ability after 2 years of not performing these tasks.

"(1)" Choices

"(1)" Choices				A			B		
F	%		Tasks	N	Mean	SD	N	Mean	SD
15	9.6	1.	Select antennas and transmission lines.	157	4.00	1.325	150	3.22	1.242
5	3.2	2.	Identify RF interference.	155	4.33	.988	150	3.60	1.215
10	6.5	3.	Classify radio signal, modulation, and keying method; determine bandwidth.	155	3.94	1.202	149	3.19	1.227
27	17.3	4.	Perform external analysis of signals using publications and working aids.	156	3.53	1.439	150	2.86	1.253
13	8.3	5.	Process and service mission-related materials.	156	3.89	1.258	148	3.05	1.222
6	3.8	6.	Account for, handle, stow, transmit and destroy classified material.	157	4.23	1.067	151	3.57	1.219

Table D-8-3a (Continued)

23	14.6	7.	Prepare magnetic recordings and care for magnetic tapes.	157	4.03	1.469	149	3.58	1.419
8	5.2	8.	Identify non-Morse signals and terms.	155	4.03	1.101	148	3.32	1.229
19	12.3	9.	Identify MIJI (Meaconing, Interference, Jamming and Intrusion) signals.	155	3.52	1.350	148	2.89	1.196
50	32.1	10.	Identify and classify ELINT and ELSEC signals and terms.	156	2.72	1.413	145	2.17	1.149
113	72.0	11.	Calculate maximum and minimum range and range resolution of radars.	157	1.55	.950	145	1.43	1.434
131	84.0	12.	Identify radar fingerprinting applications.	156	1.26	.654	145	1.28	.684
118	77.1	13.	Read and use SEDSCAF.	153	1.53	1.089	143	1.48	.978
54	34.6	14.	Perform tactical reporting.	156	2.81	1.589	149	2.40	1.288
14	9.0	15.	Recognize and report CRITIC.	156	3.71	1.276	150	3.09	1.300
18	11.7	16.	Operate computer-based systems.	156	3.74	1.330	147	3.12	1.255
12	7.8	17.	Operate receiving and peripheral equipment and perform operator functions; detect malfunctions.	154	4.01	1.239	146	3.25	1.202
8	5.1	18.	Interpret functions of the NAVSECGRU; interpret SI security classification designations and categories.	157	4.03	1.118	150	3.35	1.182
56	35.9	19.	Use on-line and off-line analysis equipment and produce visual and graphic displays to aid in identifications of system characteristics.	156	2.72	1.552	147	2.37	1.315
59	37.6	20.	Prepare for and perform fleet direct support operations.	157	2.89	1.662	146	2.56	1.457
40	25.5	21.	Prepare routine technical reports.	157	3.19	1.539	148	2.67	1.306
12	7.6	22.	Identify classes of ships, aircraft, and missiles.	157	3.31	1.165	150	2.67	1.079
8	5.2	23.	Identify categories of SIGINT alerts.	155	3.94	1.091	148	3.22	1.124
		24.	I can/could type.						
		25.	I can/could copy Morse code.						

Table D-8-3b

Overall Summary of Available CTT Active Duty Questionnaire Data

PART 1:	ANSWER KEY:
1. If necessary, correct your Service Number.	(1) Have never performed the task.
2. Does your current billet require you to work in your Navy rating? Yes 147 No 8	(2) Can/could do simple parts of the task (need direct supervision).
3. What type duty is your current billet? Sea 138 Shore 18	(3) Can/could do most parts of the task (need general supervision).
	(4) Can/could do all parts of the task (need only occasional supervision. Meets minimum local speed and accuracy standards.)
	(5) Can/could do complete task quickly and accurately (need no supervision).

PART 2:

For each job task statement below:

A. Use the answer key above to indicate your CURRENT level of ability.

B. Use the answer key above to estimate your EXPECTED level of ability after 2 years of not performing these tasks.

"(1)" Choices				A			B	
F	%	Tasks	N	Mean	SD	N	Mean	SD
-	-	1. Select antennas and transmission lines.						
-	-	2. Identify RF interference.						
-	-	3. Classify radio signal, modulation, and keying method; determine bandwidth.						
23	13.1	4. Perform external analysis of signals using publications and working aids.	176	3.79	1.372	174	2.96	1.155
-	-	5. Process and service mission-related materials.						
5	2.8	6. Account for, handle, stow, transmit and destroy classified material.	176	4.19	1.024	174	3.66	1.121

Table D-8-3b (Continued)

–	–	7. Prepare magnetic recordings and care for magnetic tapes.						
25	14.7	8. Identify non-Morse signals and terms.	176	3.37	1.359	173	2.68	1.185
102	58.0	9. Identify MIJI (Meaconing, Interference, Jamming and Intrusion) signals.	176	2.10	1.431	170	1.93	1.195
–	–	10. Identify and classify ELINT and ELSEC signals and terms.						
–	–	11. Calculate maximum and minimum range and range resolution of radars.						
–	–	12. Identify radar fingerprinting applications.						
–	–	13. Read and use SEDSCAF.						
–	–	14. Perform tactical reporting.						
40	22.6	15. Recognize and report CRITIC.	177	3.18	1.488	172	2.67	1.229
21	12.0	16. Operate computer-based systems.	175	3.96	1.383	171	3.28	1.223
–	–	17. Operate receiving and peripheral equipment and perform operator functions; detect malfunctions.						
–	–	18. Interpret functions of the NAVSECGRU; interpret SI security classification designations and categories.						
–	–	19. Use on-line and off-line analysis equipment and produce visual and graphic displays to aid in identifications of system characteristics.						
–	–	20. Prepare for and perform fleet direct support operations.						
–	–	21. Prepare routine technical reports.						
–	–	22. Identify classes of ships, aircraft, and missiles.						
–	–	23. Identify categories of SIGINT alerts.						
		24. I can/could type.						
		25. I can/could copy Morse code.						

Task Performance Data

The data summary tables (D-8-2 and D-8-3b) show the number (F) and percent (%) of respondents reporting that they had never performed particular job tasks (i.e., they responded to the task description with a "1.") For IRRs, these data refer to the "at EAOS" answers and for active duty to the current (NOW) level of ability.

Tables D-8-2 and D-8-3b also show, for each task listed on a questionnaire, mean values for performance proficiency/competency, the standard deviation (SD) around the mean, and the number of cases (n) on which a mean is based. For the IRR sample, table D-8-2, the "A" column reflects current average ability level; the "B" column, EAOS average ability level. For the active duty sample (table D-8-3b), the "A" column refers to current (NOW) ability and the "B" to proficiency expected after 2 years of nonperformance of a task.[1]

For the IRR group, an overall grand mean for current proficiency was computed over all tasks for the rating. This single number indicates that considering the CTT-3 job in its entirety (as reflected by the tasks used) the average IRR member feels that he could now perform most tasks of the rating at a level where general supervision would be needed (mean = 2.9).

For the active duty group, means reflecting proficiency on each job task for CTTs working/not working in their rating were computed. These are shown in table D-8-4. Again, the expected-after-2-years data are provided for information only.

SKILL DETERIORATION

Table D-8-5 displays task proficiency means for two subgroups of the CTT IRR respondents: (1) those who answered that they were now working ("W") in a field related to the Navy CTT rating and (2) those who indicated that they were not working ("N") in a related field. Both EAOS and NOW (current) proficiency means are given. These means, as well as those in table D-8-4, were computed from choices of 2, 3, 4, or 5 from the answer key. These choices place proficiency along a continuum from "Need direct supervision" through "Need no supervision."

As mentioned earlier, skill deterioration is reflected by differences between EAOS proficiency and NOW proficiency. In table D-8-5, values preceded by a minus sign represent a decrease in proficiency during IRR membership: current proficiency is less than EAOS proficiency. Values with no signs indicate increases in proficiency.

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[1] These expected-after-2-years proficiency values were not used in subsequent analyses, however, since it was clear that many respondents did not understand the question being asked.

Table D-8-4

Available Task Mean Values for Two Subgroups of Active Duty CTIs

	Not Working ("N")[1]		Working ("W")[2]	
Task	NOW	EXP	NOW	EXP
1	-	-	-	-
2	-	-	-	-
3	-	-	-	-
4	4.077	3.154	4.217	3.248
5	-	-	-	-
6	4.267	3.800	4.286	3.730
7	-	-	-	-
8	4.154	3.000	3.715	2.970
9	3.000	2.250	3.701	3.054
10	-	-	-	-
11	-	-	-	-
12	-	-	-	-
13	-	-	-	-
14	-	-	-	-
15	3.818	3.100	3.810	3.163
16	4.308	3.643	4.371	3.518

Composite Mean:* Group W NOW
EXP
Group N NOW
EXP

Overall Mean:* NOW
EXP

*These values were not computed for this rating.

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[1] n = 16
[2] n = 159

Table D-8-5

Task Mean Values for Two Subgroups of IRR CTTs

	Not Working ("N")[1]		Working ("W")[2]		Mean Difference	
Task	NOW	EAOS	NOW	EAOS	"N"	"W"
1	3.471	4.357	3.526	4.167	-0.886	-0.641
2	3.649	4.403	3.903	4.091	-0.754	-0.188
3	3.217	4.344	3.565	4.043	-1.127	-0.478
4	3.433	4.531	4.160	4.696	-1.098	-0.536
5	3.183	4.651	3.958	4.174	-1.468	-0.216
6	3.850	4.719	4.458	4.480	-0.869	-0.022
7	4.226	4.848	4.808	4.917	-0.622	-0.109
8	3.295	4.523	4.167	4.292	-1.228	-0.125
9	2.690	3.783	3.647	3.765	-1.093	-0.118
10	2.930	4.271	3.650	4.263	-1.341	-0.613
11	2.556	3.742	3.786	3.231	-1.186	0.555
12	2.762	3.963	3.529	3.882	-1.201	-0.353
13	2.565	3.769	3.600	3.688	-1.204	-0.088
14	3.047	4.370	3.813	4.188	-1.323	-0.375
15	3.114	4.241	3.684	4.250	-1.127	-0.566
16	3.679	4.000	4.654	4.542	-0.321	0.112
17	3.361	4.469	4.192	4.577	-1.108	-0.385
18	3.322	4.484	4.042	4.360	-1.162	-0.318
19	3.167	4.426	4.120	4.480	-1.259	-0.360
20	3.026	4.122	4.533	4.214	-1.096	-0.681
21	3.421	4.367	4.136	4.400	-0.946	-0.264
22	2.955	3.851	3.278	3.650	-0.896	-0.372
23	2.900	3.927	3.333	3.783	-1.027	-0.450

Composite Mean:	Group W	NOW	3.893
		EOS	4.180
	Group N	NOW	3.210
		EOS	4.268
Overall Mean:		NOW	3.551
		EOS	4.224

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[1] n = 67

[2] n = 27

The table shows that CTTs who now work ("W") in a field related to their former active duty jobs gained proficiency on 2 of 23 job tasks. This group also reported less skill deterioration over all other rating tasks than the "N" subgroup. Statistical tests (*t* tests for independent means; see Guilford and Fruchter, 1973) indicated that over all tasks of the CTT rating, the proficiency of the two subgroups was equivalent at EAOS ($t = -.8476$, $p < .2006$). Task mean proficiency values differed significantly ($\bar{t} = 5.71$, $p < .00000045$) on current (NOW) proficiency.

TIME IN IRR

Table D-8-6 provides a breakdown of CTT personnel by time spent in the IRR prior to mail out of the questionnaires. The table also shows mean values assigned for proficiency for 6-month intervals of IRR time, and for IRRs off active duty more than 3 years. These mean values are shown for information only, since the number of individuals in each group is too small to permit meaningful quantitative interpretation.

Table D-8-6

Mean Proficiency Values for CTT IRR Respondents by Time Since EAOS

Time (Mos.) Since EAOS	Mean	No. of Cases
0-5	3.23	3
6-11	-	-
12-17	3.46	2
18-23	-	-
24-35	2.83	5
36+	2.86	71
Overall Mean	2.89	81

COMMENTS AND OBSERVATIONS

Comments and observations on the data are offered here. As warranted, interpretations are made and discussed. These interpretations provide the basis for certain conclusions about skill deterioration and retraining needs. Our conclusions are based on best available data. However, they are subject to validation. The low questionnaire return rate coupled with the uncertain quality of the IRR data base (discussed below) require cautious inferences and limit generalizations. Nevertheless, the results do provide much useful information about the IRR that has not been available previously. They also suggest directions that should be taken with respect to the management and utilization of the IRR resource.

COMMENTS ON DATA BASE

Approximately 28 percent of questionnaires returned were classified as "nonvalid" (table D-8-1). They reflect probable errors in the IRR data base. The nonvalid category included, most prominently, questionnaires returned by the Postal Service as undeliverable (bad addresses). It also included, but to a much smaller extent, questionnaires returned by respondents with comments such as: "No longer in IRR, returned to active duty, already received final discharge. Retiree recruited from another service, was never on active duty in the Navy." (All information concerning such cases was transmitted to the Naval Reserve Personnel Center on 26 September 1985.) Finally, a very few questionnaires were returned by individuals who refused to provide information and, some, by relatives marked, "Deceased." From the above data, it can be concluded that about 28 percent of the CTT IRRs could not or would not be available for mobilization.

Questionnaires were presumably delivered by the Postal Service to a number of CTTs (73 percent) from whom and about whom no information was received. It is likely that many did not respond for reasons such as those cited above--they felt the questionnaire was not applicable. A further group, of unknown size, then would also be unavailable for mobilization because they are not in the viable IRR manpower pool as is currently believed. These considerations prompt a recommendation for review and validation of the CTT IRR roster.

Another data base issue that should be examined concerns the amount of time that CTT respondents have been away from active duty. This information is given in table D-8-6. Almost 88 percent were in the IRR for more than 3 years. Two issues emerge: (1) the need for skill upgrading and (2) availability of IRR members. Upgrade training because of new equipment, procedures, or material may be required for this group. CTT SMEs must make this determination, however, based on changes to how the job is now performed.

A second consideration concerns the Military Service Obligation (MSO). Those who are liable for a 6- or 8-year MSO (depending on when they entered on active duty) may be involuntarily recalled. Those who are beyond the MSO may only be recalled under existing agreements. If these agreements do not exist, still fewer individuals may be actually recallable for mobilization. The size of the available IRR manpower pool may be overestimated. Again, the recommendation is made that this data base be reviewed and validated if this is not already occurring. This should include an attempt to determine why so few CTTs were in the IRR group separated less than 3 years.

SKILL DETERIORATION

Information directly pertinent to the question of skill deterioration was presented in table D-8-5. In table D-8-5, differences between mean values at EAOS and NOW (current proficiency) are shown. Values preceded by a minus sign represent skill deterioration potentially attributable to time spent in the IRR.

Approximately 29 percent of CTT IRRs reported that they now work in a civilian occupation related to the CTT rating and the effects of this work experience on skill deterioration will be considered next. As table D-8-5 shows, CTTs who now work in a field related to their Navy rating gained proficiency on two job tasks. This "W" subgroup also reported less skill deterioration than the "N" subgroup for all other CTT job tasks. Taken over all tasks, differences between the current (NOW) proficiency means for the two subgroups were statistically significant. Also, they could not be attributed to initial differences between the groups at EAOS. Thus, civilian CTT-related employment significantly affected skill deterioration. Those continuing to work in the CTT field after EAOS reported less deterioration. The tasks on which the greatest amount of skill deterioration occurred are easily identifiable from table D-8-5.

TRAINING NEEDS

While skill deterioration information is of interest in its own right, the more important concern of this study is with determining the need for training IRR personnel prior to mobilization. Thus, the implications of skill deterioration data must be assessed against the criterion of acceptable level of proficiency. This can be done most directly by comparing the current proficiency levels reported by CTT IRRs against the levels reported by active duty CTT-3s. The task means for the active duty sample can be taken as E-4 criterion performance since they reflect the level of proficiency claimed by the average CTT-3 now on active duty.

The meaning of specific numerical values reported for task means must be clearly understood before conclusions about skill deterioration or training needs can be addressed. Attention is directed to the "answer key" shown on either tables D-8-2 or D-8-3a or b. The answer key shows that a value of "4," for example, represents skilled performance with only a need for occasional supervision. Following conventional practice, we assume that a "4" is reflected by any values between 3.50 and 4.49. A "3" is interpreted similarly. Skill deterioration may be shown by lower mean values for NOW (i.e., current) versus EAOS proficiency. However, the change from EAOS scores may not be sufficient to move the IRR respondents to a lower proficiency category. For example, skill loss on tasks 1 to 10 occurred for the IRRs working in a related field. However, the losses reported resulted in the IRRs remaining in the "4" category (see table D-8-5). We would conclude that the deterioration is of no consequence insofar as signaling a need for retraining.

Assessment of the need for training IRR personnel to support mobilization should proceed with the application of similar logic. Table

D-8-7 below presents the task mean values reported for current proficiency by IRR personnel who are not working in a field related to the CTT rating and also for those who are. These values are from table D-8-5. Task proficiency means for active duty personnel working in their rating (taken from table D-8-4) are also shown in table D-8-7. Inspection of the data shows that 21 of the 23 job tasks are essentially "4"s for IRR CTTs working in a related field. For IRR CTTs not working in a related field, 5 of the 23 job tasks are "4"s. Hence, from these data alone, a fair conclusion is that training of CTR IRRs working in a related field would not be required before mobilization to bring proficiency to an acceptable level. On the other hand, training of CTT IRRs not working in a related field would be recommended before mobilization.

Table D-8-7

Task Mean Proficiency Values for IRR and Active Duty CTTs

	IRR		Active Duty
Tasks	Not in Field	In Field	In Rating
1	3.5	3.5	-
2	3.6	3.9	-
3	3.2*	3.6	-
4	3.4*	4.2	4.2
5	3.2*	4.0	-
6	3.9	4.5	4.3
7	4.2	4.8	-
8	3.3*	4.2	3.7
9	2.7*	3.6	3.7
10	2.9*	3.7	-
11	2.6*	3.8	-
12	2.8*	3.5	-
13	2.6*	3.6	-
14	3.0*	3.8	-
15	3.1*	3.7	3.8
16	3.7	4.7	4.4
17	3.4*	4.2	-
18	3.3*	4.0	-
19	3.2*	4.1	-
20	3.0*	3.5	-
21	3.4*	4.1	-
22	3.0*	3.3*	-
23	2.9*	3.3*	-

*Probable training needs.

From our assessment, there seems to be no need for extensive retraining or maintenance training of CTTs working in the field. In this case, the average IRR CTT should be able to perform required job tasks at an appropriate level of competency with a modicum of refamiliarization. For the most part, this could probably be given by close, corrective supervision while the returnee is performing job tasks.

The picture is different for CTT IRRs not working in the field. This average IRR CTT cannot be expected to be able to perform required job tasks at mobilization. Accordingly, retraining is indicated. Due to the nature of the CTT job, tasking should be issued to the appropriate CT community to develop a premobilization curriculum for formal training for this rating. Training emphasis should be on the tasks identified in table D-8-7.

An additional factor to consider in assessing needs for training, however, concerns time since EAOS. Almost 88 percent of the CTT IRRs in the sample were away from active duty for more than 3 years (see table D-8-6). Subject matter experts who review the data provided here may determine that skill upgrade training is required because of technical changes (e.g., new equipment, materials, procedures) in the field.

VALIDATION OF DATA

Our analyses indicate that to support mobilization there is a need for retraining CTT IRRs who are not currently working in civilian jobs related to the rating. For CTT IRRs now working in a rating-related job, it would appear that required proficiency (i.e., the level shown by current job incumbents) can for the most part be achieved by familiarization training under direct corrective supervision in quite short time periods for most job tasks. At worst case, instructional modules for training these prospective CTT returnees on given individual tasks may be required. There is an indication that retraining for most rating tasks, such as would be developed by a formal school setting (e.g., "A" School) is needed for retraining CTT IRRs not working in the field as civilians. Information not readily available to the project staff is needed, however, for firm decisions about the need for training to bring prospective IRR returnees to an acceptable level of proficiency or to maintain their skills at a defined level. We recommend that the information provided by this report be evaluated/validated against a number of other considerations. Resource sponsors would be appropriate to validate training needs.

Data Review

As noted previously, the conclusions generated by the project staff are considered tentative and subject to verification. Generalizations from the data have also been limited because of the small numbers of questionnaires returned and because of suspected IRR data base inadequacies. It is believed, however, that much useful information can be gleaned from the descriptive summaries provided. Most of this information has not previously been available because of the many difficulties inherent in conducting skill deterioration research and restrictions on methods that can be used because of practical considerations. Maximum exploitation of the information that is now available is in order. A complete and accurate assessment of the meaning and action implications of the data should be made by individuals who are thoroughly knowledgeable of technical requirements of the CTT rating. The NAVTRASYSCEN, if requested, could assist SMEs in this effort. Areas to be considered in the review/validation process are discussed next.

Review Areas

For our study, SMEs from the Naval Technical Training Center, Corry Station, Pensacola, FL, identified the job tasks they thought would be appropriate for returning IRR CTT members to perform. Other SMEs may not agree on the list. Resource sponsors should determine if these are indeed the job tasks that an IRR returnee (at mobilization) should be able to perform. Further, a companion decision is required concerning the acceptability of the reported level of competency. Since active duty personnel report that they, on the average, now perform at these levels, these data reflect E-4 criterion performance. Resource sponsors should consider whether less proficiency would be acceptable. If so, attendant training requirements for IRRs with concomittant resource requirements would be lessened. On judging the need for training, task criticality, in terms of personnel or equipment safety as it interacts with recent changes to material, procedures, or equipment, must also be considered.

An additional decision factor concerns plans for utilization of IRR personnel at mobilization. If these individuals will serve as casualty replacements, then a fairly high level of proficiency at recall is desirable. Training, as determined by the study data and by the resource sponsor, should occur prior to recall. If, however, IRR members will replace current active duty personnel in less demanding assignments, then time would be available for receiving units or some especially chartered intermediate activity to provide needed training.

CONCLUSIONS

1. Mobilization planners should be aware that the size of the CTT IRR manpower pool may be smaller than believed. Approximately 27 to 28 percent of the pool may not be contactable by mail. An additional segment of unknown size may have already reenlisted and/or not be useful to the Navy for other reasons. A substantial percentage of CTTs listed in IRR files could also be beyond the zone of involuntary recall.

2. CTT IRR personnel who work in civilian occupations related to their CTT rating reported less deterioration of skills than CTTs who are not similarly employed.

3. Comprehensive retraining for CTTs who do not work in civilian occupations related to their CTT rating may be necessary prior to mobilization. Formal refresher training in an institutional setting should be considered.

4. CTT personnel off active duty for greater than 3 years will probably require training on selected tasks to update skills.

5. Of the 23 CTT job tasks for which skill deterioration was assessed, indications are that several will require training for returning skills to an acceptable level of proficiency prior to mobilization recall.

RECOMMENDATIONS

1. Review, update, and validate the IRR data base content to assure that accurate assessments of the size of the IRR manpower pool are available at all times. Take whatever other steps are necessary and available to assure continuous updating of the data base.

2. Amend existing procedures where possible to obtain information from IRR members concerning civilian employment. At the very least, obtain this information from those eligible for or receiving bonuses for continued IRR service. Consider these individuals as first choice for mobilization recall.

3. Request resource sponsors review the data of this study. Determine if agreement can be reached that the tasks generated by schoolhouse SMEs adequately represent the CTT-3 job. Determine that the CTT-3 job is, in fact, acceptable as the target performance level for training to support mobilization. Request resource sponsors consider the data of this study against factors such as changes to materials, procedures, equipment used by the rating, criticality of task performance, and mobilization plans for IRR personnel.

4. Consider recalling a sample of CTT IRRs to assess their knowledge of current CTT-3 job requirements. Use this information to validate the data and conclusions of this study.

5. Task the NAVTECHTRACEN, Corry Station, Pensacola, FL, to develop a premobilization curriculum for CTT IRRs.

APPENDIX D

ANNEX 9

ELECTRICIAN'S MATE (EM): SKILL DETERIORATION DURING NAVY INDIVIDUAL READY RESERVE (IRR) MEMBERSHIP

INTRODUCTION

Following a first-tour of active duty, Naval personnel who do not elect other reserve options are assigned to the Individual Ready Reserve (IRR) to complete a specified Military Service Obligation (MSO); other personnel may voluntarily enlist in the IRR. IRR members, typically in a nonpay, nondrill status, are subject to recall to active duty if mobilization of the Armed Forces is ordered. A major concern of mobilization planners is that the skills acquired on active duty may deteriorate over time under the IRR condition of nonuse. This raises the question of the contribution that can be made by recalled IRR service members. To determine the extent and nature of skill deterioration during IRR membership, the Naval Training Systems Center (NAVTRASYSCEN), Code 10, conducted an assessment study. The study was performed at the request of the Chief of Naval Operations (OP-01R1).

This study assessed skill deterioration for 16 critical Navy ratings identified by OP-01. The designation "critical" was based on the criterion of projected personnel shortfalls for mobilization. The Electrician's Mate (EM) rating was one of these 16.

PURPOSE OF THE STUDY

The purpose of the study was to assess skill deterioration during IRR membership and determine needs for training IRR personnel to restore, upgrade, or maintain their skills at minimum proficiency levels to support mobilization. Implicit in the tasking was the additional requirement to define minimum, or acceptable, proficiency.

In a general sense, acceptable proficiency refers to the ability of a recalled ready reservist to make an effective contribution to a receiving unit's mission. In a more specific sense, it refers to ability to perform a defined set of job tasks at a defined level of competency. Performance proficiency information was essential to establish a baseline around which obtained skill deterioration information could be assessed and to define the terminal performance goals that any proposed training regimen should attempt to achieve.

APPROACH

Complete details of the technical approach to the study are presented in the main body of this report. A brief description is presented here.

Mail-out questionnaires were used to obtain information. Two senior enlisted EMs, assigned to the Service School Command, Great Lakes, IL, served as subject matter experts (SME) for questionnaire development. Under guidance given by the project staff, the EM SMEs selected from various source materials a set of job tasks that, in their judgment, best represented the job (non-NEC specific) of an active duty EM-3. This level was chosen in the belief that a recalled ready reservist who could perform EM job tasks competently at the E-4 level would make a positive work contribution to a receiving unit.

The EM-3 job task statements were used on questionnaires mailed to IRR and active duty personnel. Information sought concerned tasks performed and the level of competency attached to the performance of each. Level of competency was defined in terms of the amount of supervision needed to perform specific job tasks.

Questionnaires mailed to IRR personnel requested information about proficiency on each job task at the End of Active Obligated Service (EAOS) and at the present time (NOW). The difference between proficiency at EAOS and current proficiency would reflect skill deterioration during IRR membership.

Questionnaires mailed to active duty EM-3s requested information about current proficiency on job tasks and proficiency expected after 2 years of nonperformance of the job tasks. The current proficiency estimates were needed to define criterion job performance for an active duty EM-3. The data reflecting what is currently done on the job would define an acceptable level of performance. These data could be used as a baseline for judging amount and consequences of IRR skill deterioration. Copies of these data collection instruments are shown in the next section.

As of 25 September 1984, 1,190 EMs were listed in Naval Military Personnel Command (NAVMILPERSCOM) computer files as assigned to the IRR. Names and addresses were obtained from NAVMILPERSCOM through the Naval Reserve Personnel Center (NAVRESPERSCEN). Questionnaires were mailed on 21 November 1984 under CNO (OP-11) cover letter to a random sample of 500 (42 percent). Because of a low initial return rate, a follow-up mailing (351) was made on 29 January 1985. Questionnaire returns were accepted until 28 February 1985.

Coordination with Commander in Chief, U.S. Atlantic Fleet (CINCLANTFLT), Commander in Chief, U.S. Pacific Fleet (CINCPACFLT), and within CNO (OP-01) was accomplished for authorization to survey active duty EM-3 personnel. An EM-3 roster, current as of 2 August 1985, was obtained from NAVMILPERSCOM. From a pool of 4,692, a sample of 449 EM-3s was determined using accepted survey research methods. Questionnaires were mailed on 18 September 1985 under CNO (OP-11) cover letter to unit/activity commanding officers for distribution to EM-3s named. Returns were accepted until 31 December 1985. Returned questionnaires were scanned to determine data usability, and data were entered into computer files. Subsequently, summaries of the information of interest to the study were prepared.

RESULTS

Results pertinent to the assessment of EM skill deterioration are presented in this section.

QUESTIONNAIRE RETURN STATISTICS

Table D-9-1 shows, for both the IRR and active duty EMs, the number of questionnaires mailed and number and percent of usable returns. For the IRR sample, the number/percent of nonvalid returns (nonvalid principally because

of data base errors) is also shown. Percent usable returns was derived by dividing the number returned (198) by the number delivered (i.e., 500 - 35 = 465).

Table D-9-1

Questionnaire Return Statistics

Sample	No. Mailed	Usable Returns No.	Usable Returns %	Nonvalid No.	Nonvalid %
IRR	500	198	43	35	7
Active Duty	449	295	66		

QUESTIONNAIRE DATA SUMMARIES

Summaries of data obtained from the questionnaires are presented in table D-9-2 for IRR personnel and in table D-9-3 for active duty personnel. The tables are modified questionnaire forms.

Background Questions

Of 189 IRR EMs answering the question, 104 (approximately 55 percent) reported that they now work in a civilian occupation related to their Navy EM rating. Answers to the remaining two background questions for IRRs (see table D-9-2) are not reported since it was determined that the answers might be redundant and could not be unambiguously interpreted. Of the active duty respondents answering the background questions (see table D-9-3), 274 of 294 (93 percent) work in rating. Two hundred and fifty-nine (89 percent) are assigned shore duty.

Task Performance Data

The data summary tables (D-9-2 and D-9-3) show the number (F) and percent (%) of respondents reporting that they had never performed particular job tasks (i.e., they responded to the task description with a "1.") For IRRs, these data refer to the "at EAOS" answers and for active duty to the current (NOW) level of ability. A rank-order correlation (see Siegel, 1956) computed between the two sets of data ($\underline{r} = .944$, $p < .05$) indicated significant agreement between the two classes of respondents. Thus, tasks which have not been performed by active duty EMs (to date) are the same tasks that had not been performed by IRRs at EAOS.

Tables D-9-2 and D-9-3 also show, for each task listed on a questionnaire, mean values for performance proficiency/competency, the standard deviation (SD) around the mean, and the number of cases (n) on which a mean is based. For the IRR sample, table D-9-2, the "A" column

Table D-9-2

Overall Summary of EM IRR Questionnaire Data

PART 1:

1. If necessary, correct your Service Number.

2. Is the work which you do NOW related to your Navy rating?
Yes 104 No 85

3. Have you done PREVIOUS work which is related to your Navy rating since your Expiration of Active Obligated Service (EAOS)?
Yes - No -

4. Have you received training related to your Navy rating since your Expiration of Active Obligated Service (EAOS)?
Yes - No -

ANSWER KEY:

(1) Have never performed the task.

(2) Can/could do simple parts of the task (need direct supervision).

(3) Can/could do most parts of the task (need general supervision).

(4) Can/could do all parts of the task (need only occasional supervision. Meets minimum local speed and accuracy standards.)

(5) Can/could do complete task quickly and accurately (need no supervision).

PART 2:

For each job task statement below:

A. Indicate your CURRENT level of ability according to the answer key above.

B. Estimate your PREVIOUS level of ability at the time of your EAOS according to the answer key above.

"(1)" Choices				A			B		
N	%		Tasks	N	Mean	SD	N	Mean	SD
4	2.1	1.	Use and maintain technical and maintenance manuals.	194	3.99	1.180	193	4.29	.966
6	3.1	2.	Test, service, and replace batteries.	194	4.30	1.176	193	4.50	.958
5	2.6	3.	Repair or replace cables and connectors.	191	4.58	.964	190	4.66	.805
26	13.6	4.	Apply insulating material and varnishes.	191	3.83	1.431	191	3.94	1.398
13	6.8	5.	Replace worn gaskets and seals of watertight electrical fixtures.	192	4.39	1.248	192	4.52	1.102
6	3.2	6.	Use blueprints and drawings to trace circuits.	192	4.16	1.161	190	4.23	1.057

Table D-9-2 (Continued)

38	19.7	7. Operate, troubleshoot, and repair motion picture equipment.	194	2.91	1.406	193	3.17	1.401
31	16.5	8. Perform electrical work center supervisor duties.	190	3.41	1.476	188	3.55	1.426
		9. Inspect and repair or replace:						
8	4.2	a. electrical safety equipment.	192	4.20	1.268	191	4.43	.997
62	32.6	b. electrostatic vent fog precipitator.	193	2.93	1.604	190	3.06	1.640
69	37.1	c. cathode protective units.	189	2.52	1.482	186	2.60	1.501
		10. Troubleshoot and repair:						
6	3.1	a. lighting circuits, power circuits and portable tools.	194	4.42	1.099	195	4.59	.900
7	3.6	b. grounds, open circuits and short circuits in motors and controllers.	194	4.34	1.150	192	4.45	.991
28	14.7	c. small boat electrical systems.	193	3.59	1.546	190	3.86	1.430
		11. Perform preventive maintenance on:						
11	5.7	a. electrically powered ship equipment.	194	4.18	1.340	192	4.43	1.095
21	11.1	b. automatic emergency generator control systems.	192	3.53	1.369	190	3.82	1.310
13	6.8	c. electrical distribution systems.	193	3.87	1.274	190	4.11	1.186
23	12.0	d. electrical components of air conditioning and refrigeration control systems and food service equipment.	195	3.51	1.419	191	3.74	1.366
21	11.1	e. electrical components of deck machinery.	191	3.67	1.477	189	3.94	1.103
9	4.7	f. electric motors and generators.	192	3.98	1.288	190	4.25	1.103
		12. Stand electrical watches at the following stations:						
32	16.8	a. Steering engineroom.	190	3.34	1.588	191	3.91	1.529
31	16.1	b. Anchor windlass/hoist equipment and/or elevator.	190	3.39	1.541	192	3.85	1.493
20	10.5	c. Ship's service/emergency distribution switchboard.	188	3.64	1.490	191	4.24	1.320
		13. What class ship(s) were you on?						

Overall Mean: 3.78

Table D-9-3

Overall Summary of EM Active Duty Questionnaire Data

PART 1:

1. If necessary, correct your Service Number.
2. Does your current billet require you to work in your Navy rating?
   Yes 274 No 20
3. What type duty is your current billet?
   Sea 33 Shore 259

ANSWER KEY:

(1) Have never performed the task.

(2) Can/could do simple parts of the task (need direct supervision).

(3) Can/could do most parts of the task (need general supervision).

(4) Can/could do all parts of the task (need only occasional supervision. Meets minimum local speed and accuracy standards.)

(5) Can/could do complete task quickly and accurately (need no supervision).

PART 2:

For each job task statement below:

A. Use the answer key above to indicate your CURRENT level of ability.

B. Use the answer key above to estimate your EXPECTED level of ability after 2 years of not performing these tasks.

"(1)" Choices				A			B		
F	%		Tasks	N	Mean	SD	N	Mean	SD
10	3.4	1.	Use and maintain technical and maintenance manuals.	293	4.05	.995	281	3.69	1.079
22	7.5	2.	Test, service, and replace batteries.	294	4.35	1.161	280	4.18	1.129
9	3.1	3.	Repair or replace cables and connectors.	293	3.60	1.538	278	3.44	1.420
60	20.5	4.	Apply insulating material and varnishes.	293	3.60	1.538	278	3.44	1.420
19	6.5	5.	Replace worn gaskets and seals of watertight electrical fixtures.	294	4.50	1.086	282	4.36	1.028
13	4.4	6.	Use blueprints and drawings to trace circuits.	294	3.98	1.049	283	3.59	1.127
105	35.8	7.	Operate, troubleshoot, and repair motion picture equipment.	293	2.61	1.445	280	2.53	1.352

Table D-9-3 (continued)

108	37.2	8. Perform electrical work center supervisor duties.	290	2.64	1.470	275	2.56	1.340
		9. Inspect and repair or replace:						
14	4.8	a. electrical safety equipment.	293	4.28	1.093	281	3.91	1.100
94	32.3	b. electrostatic vent fog precipitator.	291	2.97	1.621	279	2.72	1.466
165	56.9	c. cathode protective units.	290	2.08	1.429	276	2.12	1.354
		10. Troubleshoot and repair:						
8	2.7	a. lighting circuits, power circuits and portable tools.	294	4.35	.954	282	3.97	1.067
13	4.4	b. grounds, open circuits and short circuits in motors and controllers.	294	4.10	1.070	283	3.63	1.185
80	27.6	c. small boat electrical systems.	290	3.27	1.601	276	3.01	1.463
		11. Perform preventive maintenance on:						
21	7.1	a. electrically powered ship equipment.	295	4.31	1.153	285	3.88	1.187
74	25.3	b. automatic emergency generator control systems.	293	3.25	1.557	286	2.94	1.253
28	9.7	c. electrical distribution systems.	288	3.77	1.280	280	3.33	1.253
64	22.0	d. electrical components of air conditioning and refrigeration control systems and food service equipment.	291	3.24	1.453	281	2.90	1.333
66	22.6	e. electrical components of deck machinery.	292	2.37	1.526	276	3.08	1.387
21	7.1	f. electric motors and generators.	294	3.89	1.175	282	3.44	1.250
		12. Stand electrical watches at the following stations:						
89	30.4	a. Steering engineroom.	293	3.39	1.742	279	2.88	1.499
99	33.7	b. Anchor windlass/hoist equipment and/or elevator.	294	3.16	1.723	276	2.80	1.470
40	13.8	c. Ship's service/emergency distribution switchboard.	289	3.93	1.437	278	3.32	1.347
		13. What class ship(s) were you on?						

reflects current average ability level; the "B" column, EAOS average ability level. For the active duty sample (table D-9-3), the "A" column refers to current (NOW) ability and the "B" to proficiency expected after 2 years of nonperformance of a task.[1] A Pearson Product Moment Correlation ($r = .959$, $p < .05$) computed between task means for IRR EAOS and active duty NOW (current proficiency) values indicated that the IRR members, while on active duty, performed job tasks at competency levels equivalent to those of current job incumbents.

For the IRR group, an overall grand mean for current proficiency was computed over all tasks for the rating. This single number indicates that considering the EM-3 job in its entirety (as reflected by the tasks used) the average IRR member feels that he could now perform tasks of the rating at a level where only occasional supervision would be needed (mean = 3.8).

For the active duty group, means reflecting proficiency on each job task for EMs working/not working in their rating were computed. These are shown in table D-9-4. Again, the expected-after-2-years data are provided for information only.

SKILL DETERIORATION

Table D-9-5 displays task proficiency means for two subgroups of the EM IRR respondents: (1) those who answered that they were now working ("W") in a field related to the Navy EM rating and (2) those who indicated that they were not working ("N") in a related field. Both EAOS and NOW (current) proficiency means are given. These means, as well as those in table D-9-4, were computed from choices of 2, 3, 4, or 5 from the answer key. These choices place proficiency along a continuum from "Need direct supervision" through "Need no supervision."

As mentioned earlier, skill deterioration is reflected by differences between EAOS proficiency and NOW proficiency. In table D-9-5, values preceded by a minus sign represent a decrease in proficiency during IRR membership: current proficiency is less than EAOS proficiency. Values with no signs indicate increases in proficiency.

The table shows that EMs who now work ("W") in a field related to their former active duty jobs gained proficiency on 11 of the 23 job tasks. Although the differences are not large, this group also reported less skill deterioration than the "N" group for all but one of the other rating tasks. Statistical tests (t tests for independent means; see Guilford and Fruchter, 1973) indicated that over all tasks of the EM rating the two subgroups were equivalent at EAOS ($t = .4990$, $p < .3101$). Task mean proficiency values, however, differed significantly ($t = 2.503$, $p < .008$) on current (NOW) proficiency.

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[1] These expected-after-2-years proficiency values were not used in subsequent analyses, however, since it was clear that many respondents did not understand the question being asked.

Table D-9-4

Task Mean Values for Two Subgroups of Active Duty EMs

	Not Working ("N")[1]		Working ("W")[2]	
Task	NOW	EXP	NOW	EXP
1	4.526	3.722	4.129	3.776
2	4.750	4.200	4.608	4.356
3	4.722	4.313	4.689	4.453
4	4.600	3.933	4.243	3.877
5	4.778	4.278	4.743	4.500
6	4.176	3.688	4.068	3.706
7	3.909	3.600	3.500	3.233
8	3.545	3.462	3.629	3.244
9A	4.471	4.000	4.444	3.988
9B	4.222	3.889	3.904	3.462
9C	3.750	3.889	3.500	3.186
10A	4.611	4.119	4.431	4.031
10B	4.353	3.875	4.247	3.762
10C	4.133	4.500	4.117	3.580
11A	4.824	4.188	4.539	4.064
11B	4.083	4.077	4.000	3.457
11C	3.867	3.625	4.086	3.604
11D	4.071	3.714	3.854	3.318
11E	4.286	3.833	4.042	3.552
11F	4.059	3.733	4.117	3.637
12A	4.357	4.083	4.439	3.601
12B	4.467	3.933	4.244	3.511
12C	4.063	3.786	4.431	3.696

Composite Mean: Group W NOW 4.174
EXP 3.721
Group N NOW 4.288
EXP 3.932

Overall Mean: NOW 4.231
EXP 3.827

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[1] n = 20
[2] n = 274

Table D-9-5

Task Mean Values for Two Subgroups of IRR EMs

	Not Working ("N")[1]		Working ("W")[2]		Mean Difference	
Task	NOW	EAOS	NOW	EAOS	"N"	"W"
1	4.137	4.402	4.248	4.277	-0.265	-0.029
2	4.453	4.642	4.626	4.590	-0.189	0.036
3	4.513	4.728	4.890	4.786	-0.215	0.104
4	4.046	4.246	4.473	4.511	-0.200	-0.038
5	4.643	4.769	4.768	4.760	-0.126	0.008
6	4.122	4.222	4.500	4.381	-0.100	0.119
7	3.475	3.662	3.488	3.682	-0.187	-0.194
8	3.879	3.923	4.138	4.128	-0.044	0.010
9A	4.441	4.577	4.643	4.566	-0.136	0.077
9B	3.833	4.000	3.986	4.042	-0.167	-0.056
9C	3.314	3.475	3.493	3.542	-0.161	-0.049
10A	4.365	4.634	4.804	4.743	-0.269	0.061
10B	4.192	4.500	4.749	4.626	-0.308	0.123
10C	4.119	4.288	4.289	4.374	-0.169	-0.085
11A	4.435	4.649	4.691	4.612	-0.214	0.079
11B	3.642	4.068	4.054	4.191	-0.426	-0.137
11C	3.957	4.342	4.333	4.284	-0.385	0.049
11D	3.873	4.147	4.021	4.043	-0.274	-0.022
11E	4.065	4.261	4.253	4.301	-0.196	-0.048
11F	3.957	4.346	4.500	4.443	-0.389	0.057
12A	3.982	4.422	4.096	4.506	-0.440	-0.410
12B	3.902	4.415	4.094	4.356	-0.513	-0.262
12C	4.095	4.563	4.314	4.638	-0.468	-0.324

Composite Mean:	Group W	NOW	4.324
		EOS	4.364
	Group N	NOW	4.063
		EOS	4.317
Overall Mean:		NOW	4.193
		EOS	4.341

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[1] n = 85

[2] n = 104

TIME IN IRR

Table D-9-6 provides a breakdown of EM personnel by time spent in the IRR prior to mail out of the questionnaires. The table also shows mean values assigned for proficiency for 6-month intervals of IRR time, and for those IRRs who have been off active duty more than 3 years. Trends in skill deterioration over time are not apparent.

Table D-9-6

Mean Proficiency Values for EM IRR Respondents by Time Since EAOS

Time (Mos.) Since EAOS	Mean	No. of Cases
0-5	3.90	23
6-11	3.72	24
12-17	3.49	28
18-23	3.99	23
24-35	3.58	17
36+	3.91	41
Overall Mean	3.78	156

COMMENTS AND OBSERVATIONS

Comments and observations on the data are offered here. As warranted, interpretations are made and discussed. These interpretations provide the basis for certain conclusions about skill deterioration and retraining needs. Our conclusions are based on best available data. However, they are subject to validation. The low questionnaire return rates coupled with the uncertain quality of the IRR data base (discussed below) require cautious inferences and limit generalizations. Nevertheless, the results do provide much useful information about the IRR that has not been available previously. They also suggest directions that should be taken with respect to the management and utilization of the IRR resource.

COMMENTS ON DATA BASE

Seven percent of questionnaires returned were classified as "nonvalid" (table D-9-1). They reflect probable errors in the IRR data base. The nonvalid category included, most prominently, questionnaires returned by the Postal Service as undeliverable (bad addresses). It also included, but to a much smaller extent, questionnaires returned by respondents with comments such as: "No longer in IRR, returned to active duty, already received final discharge. Retiree recruited from another service, was never on active duty in the Navy." (All information concerning such cases was transmitted to the Naval Reserve Personnel Center on 26 September 1985.) Finally, a very few questionnaires were returned by individuals who refused to provide information and, some, by relatives marked, "Deceased." From the above data, it can be concluded that about 7 percent of the EM IRRs could not or would not be available for mobilization. This number is not large compared to other ratings studied and is probably acceptable to mobilization planners. However, there are other data base problems to consider.

Questionnaires were presumably delivered by the Postal Service to a number of EMs (57 percent) from whom no information was received. It is likely that many did not respond for reasons such as those cited above--they felt the questionnaire was not applicable. A further group, of unknown size, then would also be unavailable for mobilization because they are not in the viable IRR manpower pool as is currently believed. These considerations prompt a recommendation for review and validation of the EM IRR roster.

Another data base issue that should be examined concerns the amount of time that IRR EM respondents have been away from active duty. This information is given in table D-9-6. Twenty-six percent were in the IRR for more than 3 years. Two issues emerge: (1) the need for skill upgrading and (2) availability of IRR members. Upgrade training because of new equipment, procedures, or material may be required for this group despite their beliefs (table D-9-6) in their continuing ability to perform job tasks at a fairly high level.

A second consideration concerns the military service obligation (MSO). Those who are liable for a 6- or 8-year MSO (depending on when they entered on active duty) may be involuntarily recalled. Those who are beyond the MSO may only be recalled under existing agreements. If these agreements do not exist, still fewer individuals may be actually recallable for mobilization. The size of the available IRR manpower pool may be overestimated. Again, the recommendation is made that this data base be reviewed and validated if this is not already occurring.

SKILL DETERIORATION

Information directly pertinent to the question of skill deterioration was presented in table D-9-5. In table D-9-5, differences between mean values at EAOS and NOW (current proficiency) are shown. Values preceded by a minus sign represent skill deterioration potentially attributable to time spent in the IRR.

Approximately 55 percent of EM IRRs reported that they now work in a civilian occupation related to the EM rating and the effects of this work experience on skill deterioration will be considered next. As table D-9-5 shows, EMs who now work in a field related to their Navy rating gained proficiency on 11 job tasks. They also reported less skill deterioration than the "N" subgroup on all but one of the other job tasks. Taken over all tasks, differences between the current (NOW) proficiency means for the two subgroups were statistically significant. Also, they could not be attributed to initial differences between the groups at EAOS. Thus, civilian EM-related employment significantly affected skill deterioration. Those continuing to work in the field after EAOS reported less deterioration. The tasks on which the greatest amount of skill deterioration occurred are easily identifiable from table D-9-5.

TRAINING NEEDS

While skill deterioration information is of interest in its own right, the more important concern of this study is with determining the need for training IRR personnel prior to a mobilization recall. Thus, the implications of skill deterioration data must be assessed against the criterion of acceptable level of proficiency. This can be done most directly by comparing the current proficiency levels reported by EM IRRs against the levels reported by active duty EM-3s. The task means for the active duty sample can be taken as E-4 criterion performance since they reflect the level of proficiency claimed by the average EM-3 now on active duty.

The meaning of specific numerical values reported for task means must be clearly understood before conclusions about skill deterioration or training needs can be addressed. Attention is directed to the "answer key" shown on either table D-9-2 or D-9-3. The answer key shows that a value of "4," for example, represents skilled performance with only a need for occasional supervision. Following conventional practice, we assume that a "4" is reflected by any values between 3.50 and 4.49. A "3" is interpreted similarly. Skill deterioration may be shown by lower mean values for NOW (i.e., current) versus EAOS proficiency. However, the change from EAOS scores may not be sufficient to move the IRR respondents to a lower proficiency category. For example, skill loss on task 10C occurred for both subgroups of IRRs. However, the losses reported resulted in the IRRs remaining in the "4" category (see table D-9-5). We would conclude that the deterioration is of no consequence insofar as signaling a need for retraining.

Assessment of the need for training IRR personnel to support mobilization should proceed with the application of similar logic. Table D-9-7 below presents the task mean values reported for current proficiency by IRR personnel who are not working in a field related to the EM rating and also for those who are working in a related field. These values are from table D-9-5. Task proficiency means for active duty personnel working in their rating (taken from table D-9-4) are also shown in table D-9-7. Inspection of the data shows that all values, with the exception of task 9c for the IRR not working in field subgroup, are essentially "4"s. Hence, from these data alone, a fair conclusion is that training of EM IRRs would not be required before mobilization to bring proficiency to an acceptable level. The only possible exception is task 9c.

From our assessment, there seems to be no need for extensive retraining or maintenance training prior to a mobilization recall. The average IRR EM should be able to perform required job tasks at an appropriate level of competency with a modicum of refamiliarization at mobilization. For the most part, this could probably be given by close, corrective supervision while the returnee is performing job tasks. This conclusion pertains to all EMs but is probably especially relevant to the 55 percent of IRR EMs who continue to work in an EM-related occupation.

Table D-9-7

Task Mean Proficiency Values for IRR and Active Duty EMs

	IRR		Active Duty
Tasks	Not in Field	In Field	In Rating
1	4.1	4.3	4.1
2	4.5	4.6	4.6
3	4.5	4.9	4.7
4	4.0	4.5	4.2
5	4.6	4.8	4.7
6	4.1	4.5	4.1
7	3.5	3.5	3.5
8	3.9	4.1	3.6
9a	4.4	4.6	4.4
9b	3.8	4.0	3.9
9c	3.3*	3.5	3.5
10a	4.4	4.8	4.4
10b	4.2	4.7	4.2
10c	4.1	4.3	4.1
11a	4.4	4.7	4.5
11b	3.6	4.1	4.0
11c	4.0	4.3	4.1
11d	3.9	4.0	3.9
11e	4.1	4.3	4.0
11f	4.0	4.5	4.1
12a	4.0	4.1	4.4
12b	3.9	4.1	4.2
12c	4.1	4.3	4.4

*Probable training needs.

An additional factor to consider in assessing needs for training, however, concerns time since EAOS. Twenty-six percent of the EM IRRs were away from active duty for more than 3 years (see table D-9-6). Subject matter experts who review the data provided here may determine that skill upgrade training is required because of technical changes (e.g., new equipment, materials, procedures) in the field.

VALIDATION OF DATA

Our analyses indicate that the need for training of EM IRRs to support mobilization requirements is not great. It would appear that required proficiency (i.e., the level shown by current job incumbents) can for the most part be achieved by familiarization training under direct corrective supervision in quite short time periods for most job tasks. There are no indications that comprehensive retraining for all rating tasks, such as would be provided in a formal school setting (e.g., "A" School), is needed. At worst case, instructional modules for training prospective EM returnees on given individual tasks may be required. Information not readily available to the project staff is needed, however, for firm decisions about the need for training to bring prospective IRR returnees to an acceptable level of proficiency or to maintain their skills at a defined level. We recommend that the information provided by this report be evaluated/validated against a number of other considerations. Resource sponsors would be appropriate to validate training needs.

Data Review

As noted previously, the conclusions generated by the project staff are considered tentative and subject to verification. Generalizations from the data have also been limited because of the small numbers of questionnaires returned and because of suspected IRR data base inadequacies. It is believed, however, that much useful information can be gleaned from the descriptive summaries provided. Most of this information has not previously been available because of the many difficulties inherent in conducting skill deterioration research and restrictions on methods that can be used because of practical considerations. Maximum exploitation of the information that is now available is in order. A complete and accurate assessment of the meaning and action implications of the data should be made by individuals who are thoroughly knowledgeable of technical requirements of the EM rating. The NAVTRASYSCEN, if requested, could assist SMEs in this effort. Areas to be considered in the review/validation process are discussed next.

Review Areas

For our study, SMEs from the Service School Command, Great Lakes, IL, identified the job tasks they thought would be appropriate for returning IRR EM members to perform. Other SMEs may not agree on the list. Resource sponsors should determine if these are indeed the job tasks that an IRR returnee (at mobilization) should be able to perform. Further, a companion decision is required concerning the acceptability of the reported level of competency. Since active duty personnel report that they, on the average, now perform at these levels, these data reflect E-4 criterion performance. Resource sponsors should consider whether less proficiency would be acceptable. If so, attendant training requirements for IRRs with concomittant resource requirements would be lessened. On judging the need for training, task criticality, in terms of personnel or equipment safety as it interacts with recent changes to material, procedures, or equipment, must also be considered.

An additional decision factor concerns plans for utilization of IRR personnel at mobilization. If these individuals will serve as casualty replacements, then a fairly high level of proficiency at recall is desirable. Training, as determined by the study data and by the resource sponsor, should occur prior to recall. If, however, IRR members will replace current active duty personnel in less demanding assignments, then time would be available for receiving units or some especially chartered intermediate activity to provide needed training. Likely, the bulk of this training could be done either on the job or in on-the-job type conditions where IRR returnees could demonstrate their ability to perform job tasks under close, corrective supervision. It is our belief, based on available data that desired proficiency would be achieved relatively quickly on most tasks. Further, while decisions must still be made concerning formal training, either institutional or via OJT, our belief is that this type of training can be limited.

Finally, based on (1) the IRR members' reports of their current relatively high residual levels of proficiency and (2) literature findings that maximum skill loss occurs after about 1 year of nonuse of skills, it appears that skill maintenance training for EMs is not strictly necessary. Again, however, this conclusion must be weighed against planned utilization of recalled IRR members. For example, a casualty replacement scenario would make maintenance training more desirable than other scenarios.

CONCLUSIONS

1. Mobilization planners should be aware that the size of the EM IRR manpower pool may be smaller than believed. Approximately 7 percent of the pool may not be contactable by mail. An additional segment of unknown size may have already reenlisted and/or not be useful to the Navy for other reasons. A substantial percentage (26 percent) of EMs listed in IRR files could also be beyond the zone of involuntary recall.

2. EM IRR personnel who work in civilian occupations related to their rating reported less deterioration of skills than EMs who are not similarly employed.

3. Comprehensive retraining and maintenance training for IRR EMs appear to be unnecessary to support mobilization. Familiarization training, at recall, consisting of supervised practice may suffice. This conclusion is subject to concurrence by subject matter expert EMs.

4. EM personnel off active duty for greater than 3 years may require training on selected tasks to update skills despite their reported continuing high proficiency levels.

5. Of the 23 EM job tasks for which skill deterioration was assessed, indications are that none will require any concerted training for returning skills to an acceptable level of proficiency prior to mobilization recall.

6. For all EM IRRs, mean values of current proficiency reported compare favorably with those reported by active duty personnel. This finding also suggests minimal needs for retraining.

RECOMMENDATIONS

1. Review, update, and validate the IRR data base content to assure that accurate assessments of the size of the IRR manpower pool are available at all times. Take whatever other steps are necessary and available to assure continuous updating of the data base.

2. Amend existing procedures where possible to obtain information from IRR members concerning civilian employment. At the very least, obtain this information from those eligible for or receiving bonuses for continued IRR service. Consider these individuals as first choice for mobilization recall.

3. Request resource sponsors review the data of this study. Determine if agreement can be reached that the tasks generated by schoolhouse SMEs adequately represent the EM-3 job. Determine that the EM-3 job is, in fact, acceptable as the target performance level for training to support mobilization. Request resource sponsors consider the data of this study against factors such as changes to materials, procedures, equipment used by the rating, criticality of task performance, and mobilization plans for IRR personnel.

4. Consider recalling a sample of EM IRRs to assess their knowledge of current EM-3 job requirements. Use this information to validate the data and conclusions of this study.

APPENDIX D

ANNEX 10

EQUIPMENT OPERATOR (EO):
SKILL DETERIORATION DURING NAVY INDIVIDUAL READY RESERVE (IRR) MEMBERSHIP

INTRODUCTION

Following a first-tour of active duty, Naval personnel who do not elect other reserve options are assigned to the Individual Ready Reserve (IRR) to complete a specified Military Service Obligation (MSO); other personnel may voluntarily enlist in the IRR. IRR members, typically in a nonpay, nondrill status, are subject to recall to active duty if mobilization of the Armed Forces is ordered. A major concern of mobilization planners is that the skills acquired on active duty may deteriorate over time under the IRR condition of nonuse. This raises the question of the contribution that can be made by recalled IRR service members. To determine the extent and nature of skill deterioration during IRR membership, the Naval Training Systems Center (NAVTRASYSCEN), Code 10, conducted an assessment study. The study was performed at the request of the Chief of Naval Operations (OP-01R1).

This study assessed skill deterioration for 16 critical Navy ratings identified by OP-01. The designation "critical" was based on the criterion of projected personnel shortfalls for mobilization. The Equipment Operator (EO) rating was one of these 16.

PURPOSE OF THE STUDY

The purpose of the study was to assess skill deterioration during IRR membership and determine needs for training IRR personnel to restore, upgrade, or maintain their skills at minimum proficiency levels to support mobilization. Implicit in the tasking was the additional requirement to define minimum, or acceptable, proficiency.

In a general sense, acceptable proficiency refers to the ability of a recalled ready reservist to make an effective contribution to a receiving unit's mission. In a more specific sense, it refers to ability to perform a defined set of job tasks at a defined level of competency. Performance proficiency information was essential to establish a baseline around which obtained skill deterioration information could be assessed and to define the terminal performance goals that any proposed training regimen should attempt to achieve.

APPROACH

Complete details of the technical approach to the study are presented in the main body of this report. A brief description is presented here.

Mail-out questionnaires were used to obtain information. Five senior enlisted EOs, assigned to the Naval Construction Center, Gulfport, MS, served as subject matter experts (SME) for questionnaire development. Under guidance given by the project staff, the EO SMEs selected from various source materials a set of job tasks that, in their judgment, best represented the job (non-NEC specific) of an active duty EO-3. This level was chosen in the belief that a recalled ready reservist who could perform job tasks competently at the E-4 level would make a positive work contribution to a receiving unit.

The EO-3 job task statements were used on questionnaires mailed to IRR and active duty personnel. Information sought concerned tasks performed and the level of competency attached to the performance of each. Level of competency was defined in terms of the amount of supervision needed to perform specific job tasks.

Questionnaires mailed to IRR personnel requested information about proficiency on each job task at the End of Active Obligated Service (EAOS) and at the present time (NOW). The difference between proficiency at EAOS and current proficiency would reflect skill deterioration during IRR membership.

Questionnaires mailed to active duty EO-3s requested information about current proficiency on job tasks and proficiency expected after 2 years of nonperformance of the job tasks. The current proficiency estimates were needed to define criterion job performance for an active duty EO-3. The data reflecting what is currently done on the job would define an acceptable level of performance. These data could be used as a baseline for judging amount and consequences of IRR skill deterioration. Copies of the data collection instruments are shown in the next section.

As of 25 September 1984, 459 EOs were listed in Naval Military Personnel Command (NAVMILPERSCOM) computer files as assigned to the IRR. Names and addresses were obtained from NAVMILPERSCOM through the Naval Reserve Personnel Center (NAVRESPERSCEN). Questionnaires were mailed on 31 October 1984 under CNO (OP-11) cover letter to a random sample of 370 (81 percent). Because of a low initial return rate, a follow-up mailing (256) was made on 29 January 1985. Questionnaire returns were accepted until 28 February 1985.

Coordination with Commander in Chief, U.S. Atlantic Fleet (CINCLANTFLT), Commander in Chief, U.S. Pacific Fleet (CINCPACFLT), and within CNO (OP-01) was accomplished for authorization to survey active duty EO-3 personnel. An EO-3 roster, current as of 2 August 1985, was obtained from NAVMILPERSCOM. From a pool of 443, a sample of 271 EO-3s was determined using accepted survey research methods. Questionnaires were mailed on 18 September 1985 under CNO (OP-11) cover letter to unit/activity commanding officers for distribution to EO-3s named. Returns were accepted until 31 December 1985. Returned questionnaires were scanned to determine data usability, and data were entered into computer files. Subsequently, summaries of the information of interest to the study were prepared.

RESULTS

Results pertinent to the assessment of EO skill deterioration are presented in this section.

QUESTIONNAIRE RETURN STATISTICS

Table D-10-1 shows, for both the IRR and active duty EOs, the number of questionnaires mailed and number and percent of usable returns. For the IRR sample, the number/percent of nonvalid returns (nonvalid principally because

of data base errors) is also shown. Percent usable returns was derived by dividing the number returned (147) by the number delivered (i.e., 370 - 43 = 327).

Table D-10-1

Questionnaire Return Statistics

Sample	No. Mailed	Usable Returns No.	Usable Returns %	Nonvalid No.	Nonvalid %
IRR	370	147	45	43	12
Active Duty	271	143	53		

QUESTIONNAIRE DATA SUMMARIES

Summaries of data obtained from the questionnaires are presented in table D-10-2 for IRR personnel and in table D-10-3 for active duty personnel. The tables are modified questionnaire forms.

Background Questions

Of 144 IRR EOs answering the question, 89 (approximately 62 percent) reported that they now work in a civilian occupation related to their Navy EO rating. Answers to the remaining two background questions for IRRs (see table D-10-2) are not reported since it was determined that the answers would be somewhat redundant and could not be unambiguously interpreted. Of the active duty respondents answering the background questions (see table D-10-3), 120 of 140 (86 percent) work in rating. Ninety-two (66 percent) are assigned shore duty.

Task Performance Data

The data summary tables (D-10-2 and D-10-3) show the number (F) and percent (%) of respondents reporting that they had never performed particular job tasks (i.e., they responded to the task description with a "1.") For IRRs, these data refer to the "at EAOS" answers and for active duty to the current (NOW) level of ability. A rank-order correlation (see Siegel, 1956) computed between the two sets of data ($\underline{r} = .943$, $p < .05$) indicated significant agreement between the two classes of respondents. Thus, tasks which have not been performed by active duty EOs (to date) are the same tasks that had not been performed by IRRs at EAOS.

Table D-10-2

Overall Summary of EO IRR Questionnaire Data

PART 1:

1. If necessary, correct your Service Number.
2. Is the work which you do NOW related to your Navy rating?
   Yes 89 No 55
3. Have you done PREVIOUS work which is related to your Navy rating since your Expiration of Active Obligated Service (EAOS)?
   Yes - No -
4. Have you received training related to your Navy rating since your Expiration of Active Obligated Service (EAOS)?
   Yes - No -

ANSWER KEY:

(1) Have never performed the task.

(2) Can/could do simple parts of the task (need direct supervision).

(3) Can/could do most parts of the task (need general supervision).

(4) Can/could do all parts of the task (need only occasional supervision. Meets minimum local speed and accuracy standards.)

(5) Can/could do complete task quickly and accurately (need no supervision).

PART 2:

For each job task statement below:

A. Indicate your CURRENT level of ability according to the answer key above.

B. Estimate your PREVIOUS level of ability at the time of your EAOS according to the answer key above.

"(1)" Choices				A			B		
N	%		Tasks	N	Mean	SD	N	Mean	SD
25	17.9	1.	Interpret grade stake markings.	146	3.16	1.318	140	3.04	1.391
31	22.3	2.	Change attachments and adapt cable/hydraulic assemblies on tractors (wheeled and crawler) with front and rear mounted and towed attachment.	146	3.44	1.429	139	3.11	1.468
51	37.0	3.	Check grade with hand level and leveling rod and transfer elevations using a rod and engineer's level.	145	2.83	1.607	138	2.62	1.525
11	8.0	4.	Perform operator inspections, services and maintenance on automotive, construction material and support equipment.	145	4.30	.967	138	4.01	1.232
16	11.4	5.	Mount, dismount and maintain tires.	146	4.15	1.331	140	3.96	1.403

Table D-10-2 (Continued)

32	22.9	6. Use and maintain wire rope; use slings, spreaders, pallets, cargo nets and hooks.	147	3.50	1.528	140	3.27	1.540
31	22.0	7. Prepare time cards and standard material requisitions.	147	3.57	1.419	141	3.24	1.526
22	16.1	8. Maintain dispatcher records and logs.	144	3.83	1.376	137	3.66	1.487
		9. Operate, perform operator maintenance and prestart checks, change attachments and adapt cable/hydraulic assemblies on:						
52	37.4	a. Crawler crane.	146	2.81	1.599	139	2.63	1.524
51	37.5	b. Truck or wheel mounted crane.	143	2.90	1.607	136	2.63	1.529
46	34.1	c. Multi-purpose excavator.	143	2.92	1.599	135	2.69	1.513
		10. Operate/perform operator maintenance, prestart checks/ adjustments on:						
27	19.4	a. Air compressor.	145	3.83	1.458	139	3.45	1.557
65	47.8	b. Crawler mounted rock drill.	143	2.65	1.667	136	2.40	1.589
70	50.7	c. Portable rotary rock drill.	145	2.50	1.625	138	2.29	1.539
52	38.2	d. Power earth auger.	145	2.80	1.636	136	2.63	1.587
74	54.0	e. Pile drivers (diesel and pneumatic).	143	2.36	1.581	137	2.18	1.501
		11. Operate and perform operator maintenance and prestart checks on:						
37	26.6	a. Motorized and wheel tractor drawn scraper.	145	3.52	1.573	139	3.20	1.580
21	14.9	b. Motor grader.	147	3.78	1.417	141	3.53	1.471
66	48.2	c. Asphalt paver and distributor	144	2.42	1.503	137	2.22	1.439
63	47.0	d. Self-propelled soil stabilization mixer.	142	2.48	1.556	134	2.32	1.520
18	12.9	e. Rough terrain forklift.	145	4.06	1.311	140	3.89	1.433
52	38.0	f. Transit mixer.	143	3.00	1.649	137	2.76	1.629
29	20.9	g. Self-propelled compaction	145	3.73	1.538	139	3.48	1.576
20	14.7	h. Tractors (wheeled and crawler) with front and rear mounted and towed attachments.	143	4.01	1.379	136	3.79	1.425
16	11.8	i. Front end loaders (wheeled and crawler).	143	4.34	1.150	136	4.07	1.356
16	11.9	j. Warehouse and rough terrain forklifts up to and including 6000 pounds capacity.	142	4.29	1.194	135	4.01	1.401
15	10.7	k. Vehicles through 5-ton including truck-tracktor 5-ton with semi-trailer.	147	4.49	1.029	140	4.19	1.324
			Overall Mean:	3.40				

Table D-10-3

Overall Summary of EO Active Duty Questionnaire Data

PART 1:

1. If necessary, correct your Service Number.
2. Does your current billet require you to work in your Navy rating?
   Yes 120 No 20
3. What type duty is your current billet?
   Sea 48 Shore 92

ANSWER KEY:

(1) Have never performed the task.

(2) Can/could do simple parts of the task (need direct supervision).

(3) Can/could do most parts of the task (need general supervision).

(4) Can/could do all parts of the task (need only occasional supervision. Meets minimum local speed and accuracy standards.)

(5) Can/could do complete task quickly and accurately (need no supervision).

PART 2:

For each job task statement below:

A. Use the answer key above to indicate your CURRENT level of ability.

B. Use the answer key above to estimate your EXPECTED level of ability after 2 years of not performing these tasks.

"(1)" Choices				A			B		
F	%		Tasks	N	Mean	SD	N	Mean	SD
15	10.5	1.	Interpret grade stake markings.	143	3.44	1.179	139	2.88	1.145
17	11.9	2.	Change attachments and adapt cable/hydraulic assemblies on tractors (wheeled and crawler) with front and rear mounted and towed attachment.	143	3.76	1.368	139	3.33	1.337
42	29.4	3.	Check grade with hand level and leveling rod and transfer elevations using a rod and engineer's level.	143	2.54	1.299	139	2.31	1.215
4	2.8	4.	Perform operator inspections, services and maintenance on automotive, construction material and support equipment.	143	4.56	.916	140	4.26	1.050
10	7.0	5.	Mount, dismount and maintain tires.	143	4.41	1.096	138	4.15	1.220
19	13.3	6.	Use and maintain wire rope; use slings, spreaders, pallets, cargo nets and hooks.	143	3.65	1.354	139	3.36	1.367

Table D-10-3 (Continued)

24	16.8	7. Prepare time cards and standard material requisitions.	143	3.25	1.375	138	2.73	1.207
9	6.3	8. Maintain dispatcher records and logs.	142	4.06	1.186	139	3.52	1.242
		9. Operate, perform operator maintenance and prestart checks, change attachments and adapt cable/hydraulic assemblies on:						
56	39.4	a. Crawler crane.	142	2.42	1.416	135	2.48	1.321
47	33.6	b. Truck or wheel mounted crane.	140	2.64	1.489	135	2.64	1.375
50	35.5	c. Multi-purpose excavator.	141	2.71	1.533	135	2.67	1.446
		10. Operate/perform operator maintenance, prestart checks/ adjustments on:						
10	7.0	a. Air compressor.	143	4.03	1.244	138	3.60	1.259
68	47.6	b. Crawler mounted rock drill.	143	2.46	1.582	135	2.40	1.482
88	61.5	c. Portable rotary rock drill.	143	1.97	1.355	132	2.05	1.358
55	38.5	d. Power earth auger.	143	2.57	1.456	136	2.57	1.375
80	55.9	e. Pile drivers (diesel and pneumatic).	143	2.05	1.334	135	2.12	1.322
		11. Operate and perform operator maintenance and prestart checks on:						
51	35.7	a. Motorized and wheel tractor drawn scraper.	143	2.94	1.662	136	2.74	1.487
6	4.2	b. Motor grader.	143	4.30	1.075	139	3.94	1.134
55	38.5	c. Asphalt paver and distributor	143	2.59	1.474	135	2.42	1.411
90	62.9	d. Self-propelled soil stabilization mixer.	143	1.83	1.263	134	1.92	1.327
8	5.6	e. Rough terrain forklift.	143	4.51	1.093	139	4.35	1.041
61	42.7	f. Transit mixer.	143	2.76	1.683	134	2.67	1.545
15	10.6	g. Self-propelled compaction	142	3.98	1.329	139	3.74	1.332
1	.7	h. Tractors (wheeled and crawler) with front and rear mounted and towed attachments.	142	4.41	.576	137	3.96	1.187
6	4.3	i. Front end loaders (wheeled and crawler).	140	4.59	.936	135	4.31	1.054
1	.7	j. Warehouse and rough terrain forklifts up to and including 6000 pounds capacity.	143	4.69	.743	138	4.39	1.021
1	.7	k. Vehicles through 5-ton including truck-tracktor 5-ton with semi-trailer.	143	4.80	.612	138	4.49	.968

Tables D-10-2 and D-10-3 also show, for each task listed on a questionnaire, mean values for performance proficiency/competency, the standard deviation (SD) around the mean, and the number of cases (n) on which a mean is based. For the IRR sample, table D-10-2, the "A" column reflects current average ability level; the "B" column, EAOs average ability level. For the active duty sample (table D-10-3), the "A" column refers to current (NOW) ability and the "B" to proficiency expected after 2 years of nonperformance of a task.[1] A Pearson Product Moment Correlation ($r = .970$, $p < .05$) computed between task means for IRR EAOS and active duty NOW (current proficiency) values indicates that the IRR members, while on active duty, performed job tasks at competency levels equivalent to those of current job incumbents.

For the IRR group, an overall grand mean for current proficiency was computed over all tasks for the rating. This single number indicates that considering the EO-3 job in its entirety (as reflected by the tasks used) the average EO IRR member feels that he could now perform tasks of the rating at a fairly high level with an overall need for general supervision (mean = 3.4).

For the active duty group, means reflecting proficiency on each job task for EOs working/not working in their rating were computed. These are shown in table D-10-4. Again, the expected-after-2-years data are provided for information only.

SKILL DETERIORATION

Table D-10-5 displays task proficiency means for two subgroups of the EO IRR respondents: (1) those who answered that they were now working ("W") in a field related to the Navy EO rating and (2) those who indicated that they were not working ("N") in a related field. Both EAOS and NOW (current) proficiency means are given. These means, as well as those in table D-10-4, were computed from choices of 2, 3, 4, or 5 from the answer key. These choices place proficiency along a continuum from "Need direct supervision" through "Need no supervision."

As mentioned earlier, skill deterioration is reflected by differences between EAOS proficiency and NOW proficiency. In table D-10-5, values preceded by a minus sign represent a decrease in proficiency during IRR membership: current proficiency is less than EAOS proficiency. Values with no signs indicate increases in proficiency.

The table shows that EOs who now work ("W") in a field related to their former active duty jobs gained proficiency on all 30 job tasks. The "N" group lost proficiency on 19 of the 27 tasks. Statistical tests (t tests for independent means; see Guilford and Fruchter, 1973) indicated that over all tasks of the rating, the proficiency of the two subgroups was equivalent at EAOS ($t = .495$, $p < .3113$). Task mean proficiency values, however, differed significantly ($t = 3.6575$, $p < .0003$) for current (NOW) proficiency.

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[1] These expected-after-2-years proficiency values were not used in subsequent analyses, however, since it was clear that many respondents did not understand the question being asked.

Table D-10-4

Task Mean Values for Two Subgroups of Active Duty EOs

	Not Working ("N")[1]		Working ("W")[2]	
Task	NOW	EXP	NOW	EXP
1	3.786	3.133	3.703	3.037
2	3.571	3.133	4.202	3.731
3	3.500	3.333	3.122	2.821
4	4.263	3.882	4.735	4.448
5	4.813	4.667	4.649	4.355
6	4.000	3.833	4.045	3.689
7	3.667	3.063	3.673	3.095
8	4.278	3.579	4.259	3.757
9A	3.000	3.000	3.342	3.152
9B	2.889	2.846	3.506	3.293
9C	3.333	3.182	3.646	3.387
10A	4.000	3.471	4.272	3.824
10B	3.857	3.500	3.761	3.368
10C	3.600	3.250	3.469	3.189
10D	3.500	3.333	3.563	3.256
10E	3.000	3.000	3.389	3.158
11A	3.700	3.200	4.050	3.587
11B	4.333	3.789	4.448	4.018
11C	3.375	3.500	3.628	3.222
11D	3.800	3.750	3.130	3.182
11E	4.722	4.222	4.713	4.496
11F	4.500	3.923	3.971	3.580
11G	4.231	3.923	4.333	4.046
11H	4.333	3.705	4.530	4.135
11I	4.400	3.895	4.811	4.519
11J	4.350	4.053	4.773	4.522
11K	4.500	4.053	4.874	4.646

Composite Mean:	Group W	NOW	4.022
		EXP	3.686
	Group N	NOW	3.900
		EXP	3.564
Overall Mean:		NOW	3.961
		EXP	3.625

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[1] n = 20

[2] n = 120

Table D-10-5

Task Mean Values for Two Subgroups of IRR EOs

Task	Not Working ("N")[1] NOW	Not Working ("N")[1] EAOS	Working ("W")[2] NOW	Working ("W")[2] EAOS	Mean Difference "N"	Mean Difference "W"
1	3.289	3.512	3.608	3.458	-0.223	0.150
2	3.511	3.600	4.064	3.791	-0.089	0.273
3	3.353	3.517	3.951	3.589	-0.164	0.362
4	4.245	4.340	4.488	4.253	-0.095	0.235
5	4.265	4.370	4.605	4.368	-0.105	0.237
6	3.868	3.789	4.136	4.044	0.079	0.092
7	3.886	3.974	4.087	3.843	-0.088	0.244
8	4.085	4.227	4.351	4.114	-0.142	0.237
9A	3.483	3.385	3.806	3.700	0.098	0.106
9B	3.552	3.462	3.910	3.690	0.090	0.220
9C	3.414	3.296	4.061	3.705	0.118	0.356
10A	4.091	4.100	4.375	4.071	-0.009	0.304
10B	3.731	3.391	3.981	3.872	0.340	0.109
10C	3.870	3.500	3.788	3.702	0.370	0.086
10D	3.724	3.625	3.800	3.633	0.099	0.167
10E	3.409	3.500	3.820	3.600	-0.091	0.220
11A	3.919	4.088	4.299	3.985	-0.169	0.314
11B	3.854	4.136	4.380	3.919	-0.282	0.461
11C	3.500	3.500	3.526	3.294	0.000	0.232
11D	3.231	3.348	3.714	3.596	-0.117	0.118
11E	4.200	4.438	4.500	4.247	-0.238	0.253
11F	3.500	3.714	4.156	3.909	-0.214	0.247
11G	4.000	4.125	4.467	4.145	-0.125	0.322
11H	4.082	4.304	4.632	4.309	-0.222	0.323
11I	4.185	4.396	4.797	4.529	-0.211	0.268
11J	4.340	4.500	4.654	4.378	-0.160	0.276
11K	4.453	4.723	4.791	4.513	-0.270	0.278

Composite Mean:	Group W	NOW	4.176
		EOS	3.935
	Group N	NOW	3.816
		EOS	3.884
Overall Mean:		NOW	3.996
		EOS	3.910

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[1] n = 55

[2] n = 89

TIME IN IRR

Table D-10-6 provides a breakdown of EO personnel by time spent in the IRR prior to mail out of the questionnaires. The table also shows mean values assigned for proficiency for 6-month intervals of IRR time, and for those IRRs who have been off active duty more than 3 years. These mean values are shown for information only, since the number of individuals in each group is too small to permit meaningful quantitative interpretation.

Table D-10-6

Mean Proficiency Values for EO IRR Respondents by Time Since EAOS

Time (Mos.) Since EAOS*	Mean	No. of Cases
0-5	3.21	28
6-11	3.52	7
12-17	4.05	3
18-23	4.15	1
24-35	3.53	5
36+	3.41	78
Overall Mean	3.40	122

*EAOS dates were not contained on the NAVMILPERSCOM data file for a large number of IRR EOs. Consequently, time since EAOS could not be determined.

COMMENTS AND OBSERVATIONS

Comments and observations on the data are offered here. As warranted, interpretations are made and discussed. These interpretations provide the basis for certain conclusions about skill deterioration and retraining needs. Our conclusions are based on best available data. However, they are subject to validation. The low questionnaire return rates coupled with the uncertain quality of the IRR data base (discussed below) require cautious inferences and limit generalizations. Nevertheless, the results do provide much useful information about the IRR that has not been available previously. They also suggest directions that should be taken with respect to the management and utilization of the IRR resource.

COMMENTS ON DATA BASE

Approximately 12 percent of questionnaires returned were classified as "nonvalid" (table D-10-1). They reflect probable errors in the IRR data base. The nonvalid category included, most prominently, questionnaires returned by the Postal Service as undeliverable (bad addresses). It also included, but to a much smaller extent, questionnaires returned by respondents with comments such as: "No longer in IRR, returned to active duty, already received final discharge. Retiree recruited from another service, was never on active duty in the Navy." (All information concerning such cases was transmitted to the Naval Reserve Personnel Center on 26 September 1985). Finally, a very few questionnaires were returned by individuals who refused to provide information and, some, by relatives marked, "Deceased." From the above data, it can be concluded that about 12 percent of the EO IRRs could not or would not be available for a mobilization call.

Questionnaires were presumably delivered by the Postal Service to a number of EOs (55 percent) from whom no information was received. It is likely that many did not respond for reasons such as those cited above--they felt the questionnaire was not applicable. A further group, of unknown size, then would also be unavailable for mobilization because they are not in the viable IRR manpower pool as is currently believed. These considerations prompt a recommendation for review and validation of the EO IRR roster.

Another data base issue that should be examined concerns the amount of time that IRR EO respondents have been away from active duty. This information is given in table D-10-6. Sixty-four percent were in the IRR for more than 3 years. Two issues emerge: (1) the need for skill upgrading and (2) availability of IRR members. Upgrade training because of new equipment, procedures, or material may be required for this group despite their beliefs (table D-10-6) in their continuing ability to perform job tasks at a fairly high level.

A second consideration concerns the military service obligation (MSO). Those who are liable for a 6- or 8-year MSO (depending on when they entered on active duty) may be involuntarily recalled. Those who are beyond the MSO may only be recalled under existing agreements. If these agreements do not exist, still fewer individuals may be actually recallable for mobilization. The size of the available IRR manpower pool may be overestimated. Again, the recommendation is made that this data base be reviewed and validated if this is not already occurring.

SKILL DETERIORATION

Information directly pertinent to the question of skill deterioration was presented in table D-10-5. In table D-10-5, differences between mean values at EAOS and NOW (current proficiency) are shown. Values preceded by a minus sign represent skill deterioration potentially attributable to time spent in the IRR.

Approximately 62 percent of EO IRRs reported that they now work in a civilian occupation related to their EO rating and the effects of this work experience on skill deterioration will be considered next. As table D-10-5 shows, EOs who now work in a field related to their Navy rating gained proficiency on all job tasks. The subgroup not working in a related field lost proficiency on 19 of the 27 tasks. Taken over all tasks, differences between the current (NOW) proficiency means for the two subgroups were statistically significant. Also, they could not be attributed to initial differences between the groups at EAOS. Thus, civilian EO-related employment significantly affected skill deterioration. Those continuing to work in the field after EAOS reported no deterioration. The tasks on which skill deterioration occurred for the subgroup not currently working in a related field are easily identifiable from table D-10-5.

TRAINING NEEDS

While skill deterioration information is of interest in its own right, the more important concern of this study is with determining the need for training IRR personnel prior to a mobilization recall. Thus, the implications of skill deterioration data must be assessed against the criterion of acceptable level of proficiency. This can be done most directly by comparing the current proficiency levels reported by EO IRRs against the levels reported by active duty EO-3s. The task means for the active duty sample can be taken as E-4 criterion performance since they reflect the level of proficiency claimed by the average EO-3 now on active duty.

The meaning of specific numerical values reported for task means must be clearly understood before conclusions about skill deterioration or training needs can be addressed. Attention is directed to the "answer key" shown on either table D-10-2 or D-10-3. The answer key shows that a value of "4," for example, represents skilled performance with only a need for occasional supervision. Following conventional practice, we assume that a "4" is reflected by any values between 3.50 and 4.49. A "3" is interpreted similarly. Skill deterioration may be shown by lower mean values for NOW (i.e., current) versus EAOS proficiency. However, the change from EAOS scores may not be sufficient to move the IRR respondents to a lower proficiency category. Skill loss occurred, for example, on tasks 4, 5, and 6 for the IRRs not working in a related field. However, the losses reported resulted in the IRRs remaining in the "4" category (see table D-10-5). We would conclude that the deterioration is of no consequence insofar as signaling a need for retraining.

Assessment of the need for training IRR personnel to support mobilization should proceed with the application of similar logic. Table D-10-7 below presents the task mean values reported for current proficiency by IRR personnel who are not working in a field related to the EO rating and also for those who are working in a related field. These values are from table D-10-5. Task proficiency means for active duty personnel working in their rating (taken from table D-10-4) are also shown in table D-10-7. Inspection of the data shows that values assigned by the two IRR groups are essentially the same as those assigned by the active duty group. Hence, from these data alone, a fair conclusion is that training of EO IRRs would not be required before mobilization to bring proficiency to an acceptable level.

From our assessment, there seems to be no need for extensive retraining or maintenance training prior to mobilization. The average IRR EO should be able to perform most of the required job tasks at an appropriate level of competency with a modicum of refamiliarization at mobilization. For the most part, this could probably be given by close, corrective supervision while the returnee is performing job tasks. This conclusion pertains to all EOs but is probably especially relevant to the 64 percent who continue to work in a related occupation.

Table D-10-7

Task Mean Proficiency Values for IRR and Active Duty EOs

	IRR		Active Duty
Tasks	Not in Field	In Field	In Rating
1	3.3*	3.6	3.7
2	3.5	4.1	4.2
3	3.4	4.0	3.1
4	4.2	4.5	4.7
5	4.3	4.6	4.6
6	3.9	4.1	4.0
7	3.9	4.1	3.7
8	4.1	4.4	4.3
9a	3.5	3.8	3.3
9b	3.6	3.9	3.5
9c	3.4	4.1	3.6
10a	4.1	4.4	4.3
10b	3.7	4.0	3.8
10c	3.9	3.8	3.5
10d	3.7	3.8	3.6
10e	3.4	3.8	3.4
11a	3.9	4.3	4.0
11b	3.9	4.4	4.4
11c	3.5	3.5	3.6
11d	3.2	3.7	3.1
11e	4.2	4.5	4.7
11f	3.5	4.2	4.0
11g	4.0	4.5	4.3
11h	4.1	4.6	4.5
11i	4.2	4.8	4.8
11j	4.3	4.7	4.8
11k	4.5	4.8	4.9

*Probable training needs.

An additional factor to consider in assessing needs for training, however, concerns time since EAOS. Sixty-four percent of the EO IRRs were away from active duty for more than 3 years (see table D-10-6). Subject matter experts who review the data provided here may determine that skill upgrade training is required because of technical changes (e.g., new equipment, materials, procedures) in the field.

VALIDATION OF DATA

Our analyses indicate that the need for training of EO IRRs against mobilization requirements is not great. It would appear that required proficiency (i.e., the level shown by current job incumbents) can for the most part be achieved by familiarization training under direct corrective supervision in quite short time periods for most job tasks. There are no indications that comprehensive training for all rating tasks, such as would be provided in a formal school setting (e.g., "A" School), is needed. Information not readily available to the project staff is needed, however, for firm decisions about the need for training to bring prospective IRR returnees to an acceptable level of proficiency or to maintain their skills at a defined level. We recommend that the information provided by this report be evaluated/validated against a number of other considerations. Resource sponsors would be appropriate to validate training needs.

Data Review

As noted previously, the conclusions generated by the project staff are considered tentative and subject to verification. Generalizations from the data are limited because of the small numbers of questionnaires returned and because of suspected IRR data base inadequacies. It is believed, however, that much useful information can be gleaned from the descriptive summaries provided. Most of this information has not previously been available because of the many difficulties inherent in conducting skill deterioration research and restrictions on methods that can be used because of practical considerations. Maximum exploitation of the information that is now available is in order. A complete and accurate assessment of the meaning and action implications of the data should be made by individuals who are thoroughly knowledgeable of technical requirements of the EO rating. The NAVTRASYSCEN, if requested, could assist SMEs in this effort. Areas to be considered in the review/validation process are discussed next.

Review Areas

For our study, SMEs from the Naval Construction Center, Gulfport, MS, identified the job tasks they thought would be appropriate for returning IRR EO members to perform. Other SMEs may not agree on the list. Resource sponsors should determine if these are indeed the job tasks that an IRR returnee (at mobilization) should be able to perform. Further, a companion decision is required concerning the acceptability of the reported level of competency. Since active duty personnel report that they, on the average, now perform at these levels, the data reflect E-4 criterion performance. Resource sponsors should consider whether less proficiency would be acceptable. If so, attendant training requirements for IRRs with concomittant resource requirements would be lessened. On judging the need for training, task criticality, in terms of personnel or equipment safety as it interacts with recent changes to material, procedures, or equipment, must also be considered.

An additional decision factor concerns plans for utilization of IRR personnel at mobilization. If these individuals will serve as casualty replacements, then a fairly high level of proficiency at recall is desirable. Training, as determined by the study data and by the resource sponsor, should occur prior to recall. If, however, IRR members will replace current active duty personnel in less demanding assignments, then time would be available for receiving units or some especially chartered intermediate activity to provide needed training. Likely, the bulk of this training could be done either on the job or in on-the-job type conditions where IRR returnees could demonstrate their ability to perform job tasks under close, corrective supervision. It is our belief, based on available data that desired proficiency would be achieved relatively quickly on most tasks. Further, while decisions must still be made concerning formal training, either institutional or via OJT, our belief is that this type of training can be limited.

Finally, based on (1) the IRR members' reports of their current relatively high residual levels of proficiency and (2) literature findings that maximum skill loss occurs after about 1 year of nonuse of skills, it appears that skill maintenance training for EOs is not strictly necessary. Again, however, this conclusion must be weighed against planned utilization of recalled IRR members. For example, a casualty replacement scenario would make maintenance training more desirable than other scenarios.

CONCLUSIONS

1. Mobilization planners should be aware that the size of the EO IRR manpower pool may be smaller than believed. Approximately 12 percent of the pool may not be contactable by mail. An additional segment of unknown size may have already reenlisted and/or not be useful to the Navy for other reasons. A substantial percentage (26 percent) of EOs listed in IRR files could also be beyond the zone of involuntary recall.

2. EO IRR personnel who work in civilian occupations related to their rating reported proficiency gains on all job tasks. EOs not working in a related field reported only small proficiency losses.

3. Comprehensive retraining and maintenance training for IRR EOs appear to be unnecessary to support mobilization. Familiarization training, at recall, consisting of supervised practice may suffice. This conclusion is subject to concurrence by subject matter expert EOs.

4. EO personnel off active duty for greater than 3 years may require training on selected tasks to update skills if there have been substantial changes in building techniques despite their reported continuing high proficiency levels. Basic building skills probably do not require retraining.

5. Of the 27 EO job tasks for which skill deterioration was assessed, indications are that none will require any concerted training for returning skills to an acceptable level of proficiency prior to mobilization recall.

6. For all EO IRRs, mean values of current proficiency reported compared favorably with those reported by active duty personnel. This finding also suggests minimal needs for retraining.

RECOMMENDATIONS

1. Review, update, and validate the IRR data base content to assure that accurate assessments of the size of the manpower pool are available at all times. Take whatever other steps are necessary and available to assure continuous updating of the data base.

2. Amend existing procedures where possible to obtain information from IRR members concerning civilian employment. At the very least, obtain this information from those eligible for or receiving bonuses for continued IRR service. Consider these individuals as first choice for mobilization recall.

3. Request resource sponsors review the data of this study. Determine if agreement can be reached that the tasks generated by schoolhouse SMEs adequately represent the EO-3 job. Determine that the EO-3 job is, in fact, acceptable as the target performance level for training to support mobilization. Request resource sponsors consider the data of this study against factors such as changes to materials, procedures, equipment used by the rating, criticality of task performance, and mobilization plans for IRR personnel.

4. Consider recalling a sample of EO IRRs to assess their knowledge of current job requirements. Use this information to validate the data and conclusions of this study.

APPENDIX D

ANNEX 11

ELECTRONICS TECHNICIAN (ET): SKILL DETERIORATION DURING NAVY INDIVIDUAL READY RESERVE (IRR) MEMBERSHIP

INTRODUCTION

Following a first-tour of active duty, Naval personnel who do not elect other reserve options are assigned to the Individual Ready Reserve (IRR) to complete a specified Military Service Obligation (MSO); other personnel may voluntarily enlist in the IRR. IRR members, typically in a nonpay, nondrill status, are subject to recall to active duty if mobilization of the Armed Forces is ordered. A major concern of mobilization planners is that the skills acquired on active duty may deteriorate over time under the IRR condition of nonuse. This raises the question of the contribution that can be made by recalled IRR service members. To determine the extent and nature of skill deterioration during IRR membership, the Naval Training Systems Center (NAVTRASYSCEN), Code 10, conducted an assessment study. The study was performed at the request of the Chief of Naval Operations (OP-01R1).

This study assessed skill deterioration for 16 critical Navy ratings identified by OP-01. The designation "critical" was based on the criterion of projected personnel shortfalls for mobilization. The Electronics Technician (ET) rating was one of these 16.

PURPOSE OF THE STUDY

The purpose of the study was to assess skill deterioration during IRR membership and determine needs for training IRR personnel to restore, upgrade, or maintain their skills at minimum proficiency levels to support mobilization. Implicit in the tasking was the additional requirement to define minimum, or acceptable, proficiency.

In a general sense, acceptable proficiency refers to the ability of a recalled ready reservist to make an effective contribution to a receiving unit's mission. In a more specific sense, it refers to ability to perform a defined set of job tasks at a defined level of competency. Performance proficiency information was essential to establish a baseline around which obtained skill deterioration information could be assessed and to define the terminal performance goals that any proposed training regimen should attempt to achieve.

APPROACH

Complete details of the technical approach to the study are presented in the main body of this report. A brief description is presented here.

Mail-out questionnaires were used to obtain information. Six senior enlisted ETs, assigned to the Service School Command, Naval Training Center, Great Lakes, IL, served as subject matter experts (SME) for questionnaire development. Under guidance given by the project staff, the ET SMEs selected from various source materials a set of job tasks that, in their judgment, best represented the job (non-NEC specific) of an active duty ET-3. This level was chosen in the belief that a recalled ready reservist who could perform ET job tasks competently at the E-4 level would make a positive work contribution to a receiving unit.

The ET-3 job task statements were used on questionnaires mailed to IRR and active duty personnel. Information sought concerned tasks performed and the level of competency attached to the performance of each. Level of competency was defined in terms of the amount of supervision needed to perform specific job tasks.

Questionnaires mailed to IRR personnel requested information about proficiency on each job task at the End of Active Obligated Service (EAOS) and at the present time (NOW). The difference between proficiency at EAOS and current proficiency would reflect skill deterioration during IRR membership.

Questionnaires mailed to active duty ET-3s requested information about current proficiency on job tasks and proficiency expected after 2 years of nonperformance of the job tasks. The current proficiency estimates were needed to define criterion job performance for an active duty ET-3. The data reflecting what is currently done on the job would define an acceptable level of performance. These data could be used as a baseline for judging amount and consequences of IRR skill deterioration. Copies of the data collection instruments are shown in the next section.

As of 25 September 1984, 519 ETs were listed in Naval Military Personnel Command (NAVMILPERSCOM) computer files as assigned to the IRR. Names and addresses were obtained from NAVMILPERSCOM through the Naval Reserve Personnel Center (NAVRESPERSCEN). Questionnaires were mailed under CNO (OP-11) cover letter on 21 November 1984 to the population of 519. Because of a low initial return rate, a follow-up mailing (332) was made on 29 January 1985. Questionnaire returns were accepted until 28 February 1985.

Coordination with Commander in Chief, U.S. Atlantic Fleet (CINCLANTFLT), Commander in Chief, U.S. Pacific Fleet (CINCPACFLT), and within CNO (OP-01) was accomplished for authorization to survey active duty ET-3 personnel. An ET-3 roster, current as of 2 August 1985, was obtained from NAVMILPERSCOM. From a pool of 6,893, a sample of 455 ET-3s was determined using accepted survey research methods. Questionnaires were mailed on 18 September 1985 under CNO (OP-11) cover letter to unit/activity commanding officers for distribution to ET-3s named. Returns were accepted until 31 December 1985. Returned questionnaires were scanned to determine data usability, and data were entered into computer files. Subsequently, summaries of the information of interest to the study were prepared.

RESULTS

Results pertinent to the assessment of ET skill deterioration are presented in this section.

QUESTIONNAIRE RETURN STATISTICS

Table D-11-1 shows, for both the IRR and active duty ETs, the number of questionnaires mailed and number and percent of usable returns. For the IRR sample, the number/percent of nonvalid returns (nonvalid principally because of data base errors) is also shown. Percent usable returns was derived by dividing the number returned (235) by the number delivered (i.e., 519 - 52 = 467).

Table D-11-1

Questionnaire Return Statistics

Sample	No. Mailed	Usable Returns No.	Usable Returns %	Nonvalid No.	Nonvalid %
IRR	519	235	50	52	10
Active Duty	455	316	70		

QUESTIONNAIRE DATA SUMMARIES

Summaries of data obtained from the questionnaires are presented in table D-11-2 for IRR personnel and in table D-11-3 for active duty personnel. The tables are modified questionnaire forms.

Background Questions

Of 228 IRR ETs answering the question, 138 (approximately 61 percent) reported that they now work in a civilian occupation related to their Navy ET rating. Answers to the remaining two background questions for IRRs (see table D-11-2) are not reported since it was determined that the answers might be redundant and could not be unambiguously interpreted. Of the active duty respondents answering the background questions (see table D-11-3), 290 of 313 (92.7 percent) work in rating. Eighty-seven (28 percent) are assigned sea duty.

Task Performance Data

The data summary tables (D-11-2 and D-11-3) show the number (F) and percent (%) of respondents reporting that they had never performed particular job tasks (i.e., they responded to the task description with a "1.") For IRRs, these data refer to the "at EAOS" answers and for active duty to the current (NOW) level of ability. A rank-order correlation (see Siegel, 1956) computed between the two sets of data ($\underline{r} = .830$, $p < .05$) indicated significant agreement between the two classes of respondents. Thus, tasks which have not been performed frequently by active duty ETs (to date) are the same tasks that had not been performed frequently by IRRs at EAOS.

Tables D-11-2 and D-11-3 also show, for each task listed on a questionnaire, mean values for performance proficiency/competency, the standard deviation (SD) around the mean, and the number of cases (n) on which a mean is based. For the IRR sample, table D-11-2, the "A" column reflects current average ability level; the "B" column, EAOS average ability level. For the

Table D-11-2

Overall Summary of ET IRR Questionnaire Data

PART 1:

1. If necessary, correct your Service Number.
2. Is the work which you do NOW related to your Navy rating?
   Yes 138 No 90
3. Have you done PREVIOUS work which is related to your Navy rating since your Expiration of Active Obligated Service (EAOS)?
   Yes - No -
4. Have you received training related to your Navy rating since your Expiration of Active Obligated Service (EAOS)?
   Yes - No -

ANSWER KEY:

(1) Have never performed the task.

(2) Can/could do simple parts of the task (need direct supervision).

(3) Can/could do most parts of the task (need general supervision).

(4) Can/could do all parts of the task (need only occasional supervision. Meets minimum local speed and accuracy standards.)

(5) Can/could do complete task quickly and accurately (need no supervision).

PART 2:

For each job task statement below:

A. Indicate your CURRENT level of ability according to the answer key above.

B. Estimate your PREVIOUS level of ability at the time of your EAOS according to the answer key above.

"(1)" Choices				A			B		
F	%		Tasks	N	Mean	SD	N	Mean	SD
21	9.1	1.	Install and record field changes.	232	3.86	1.305	231	4.06	1.296
11	4.8	2.	Perform operational tests of electronic equipments.	232	4.10	1.139	231	3.37	1.083
51	22.3	3.	Operate distribution patching and switching systems.	230	3.11	1.445	229	3.35	1.528
10	4.3	4.	Localize equipment casualties to sub-assemblies or parts and repair.	231	4.02	1.183	231	4.23	1.085
11	4.8	5.	Align/adjust electronic equipment.	231	4.09	1.115	231	4.31	1.102
9	3.9	6.	Test/troubleshoot electronic components.	231	4.09	1.165	230	4.27	1.072
12	5.2	7.	Locate shorts or opens in cables.	232	4.48	1.040	232	4.40	1.079

Table D-11-2 (Continued)

25	11.0	8. Remove and replace cables and transmission lines.	228	4.04	1.333	228	4.07	1.347
53	23.0	9. Test and adjust synchro/servo systems.	230	2.86	1.390	230	3.13	1.465
23	10.0	10. Use primary and alternate power sources.	230	3.88	1.331	230	3.90	1.325
18	7.8	11. Make changes to technical and maintenance publications and instructions.	233	4.12	1.319	231	4.16	1.297
5	2.2	12. Use technical publications.	233	4.45	1.021	232	4.52	.916
6	2.6	13. Use electronic diagrams.	231	4.35	1.044	230	4.45	.995
14	6.0	14. Complete maintenance data forms.	232	3.72	1.228	232	4.16	1.159
14	6.1	15. Order parts, tools, and supplies.	232	3.98	1.204	231	4.30	1.147
10	4.3	16. Inspect, clean, and lubricate electronic equipment.	232	4.41	1.007	231	4.50	.995
5	2.2	17. Use and maintain handtools.	233	4.70	.811	230	4.67	.838
27	11.7	18. Have a basic knowledge of digital concepts.	232	3.93	1.350	231	3.64	1.429
15	6.5	19. Use, test, and repair general purpose test equipment.	232	3.95	1.216	230	4.10	1.208
8	3.4	20. Use basic soldering techniques.	233	4.58	.940	232	4.54	.993
			Overall Mean:	4.03				

Table D-11-3

Overall Summary of ET Active Duty Questionnaire Data

PART 1:

1. If necessary, correct your Service Number.
2. Does your current billet require you to work in your Navy rating?
   Yes 290 No 23
3. What type duty is your current billet?
   Sea 87 Shore 226

ANSWER KEY:

(1) Have never performed the task.

(2) Can/could do simple parts of the task (need direct supervision).

(3) Can/could do most parts of the task (need general supervision).

(4) Can/could do all parts of the task (need only occasional supervision. Meets minimum local speed and accuracy standards.)

(5) Can/could do complete task quickly and accurately (need no supervision).

PART 2:

For each job task statement below:

A. Use the answer key above to indicate your CURRENT level of ability.

B. Use the answer key above to estimate your EXPECTED level of ability after 2 years of not performing these tasks.

"(1)" Choices				A			B		
F	%		Tasks	N	Mean	SD	N	Mean	SD
100	31.8	1.	Install and record field changes.	314	3.09	1.583	312	2.92	1.331
6	1.9	2.	Perform operational tests of electronic equipments.	315	4.57	.816	314	3.82	1.032
42	13.3	3.	Operate distribution patching and switching systems.	315	3.63	1.328	313	2.99	1.204
7	2.2	4.	Localize equipment casualties to sub-assemblies or parts and repair.	315	4.36	.886	312	3.07	1.013
8	2.6	5.	Align/adjust electronic equipment.	312	4.39	.907	311	3.71	1.057
5	1.6	6.	Test/troubleshoot electronic components.	315	4.43	.812	312	3.82	1.042
12	3.8	7.	Locate shorts or opens in cables.	315	4.58	.911	313	4.37	1.030
35	11.1	8.	Remove and replace cables and transmission lines.	314	4.02	1.324	311	3.75	1.338

Table D-11-3 (Continued)

133	42.4	9.	Test and adjust synchro/servo systems.	314	2.46	1.454	308	2.22	1.236
28	8.9	10.	Use primary and alternate power sources.	314	4.03	1.253	309	3.63	1.236
56	17.8	11.	Make changes to technical and maintenance publications and instructions.	315	3.78	1.501	311	3.56	1.376
5	1.6	12.	Use technical publications.	316	4.71	.688	314	4.33	.921
4	1.3	13.	Use electronic diagrams.	315	4.64	.696	313	4.24	.941
29	9.2	14.	Complete maintenance data forms.	314	3.79	1.212	313	3.13	1.158
27	8.5	15.	Order parts, tools, and supplies.	316	4.12	1.253	312	3.49	1.255
6	1.9	16.	Inspect, clean, and lubricate electronic equipment.	313	4.70	.738	313	4.40	.919
4	1.3	17.	Use and maintain handtools.	315	4.80	.591	312	4.68	.709
7	2.2	18.	Have a basic knowledge of digital concepts.	316	4.15	1.003	314	3.55	1.172
19	6.0	19.	Use, test, and repair general purpose test equipment.	316	3.81	1.108	313	3.37	1.181
9	2.8	20.	Use basic soldering techniques.	316	4.47	.913	313	4.18	1.007

active duty sample (table D-11-3), the "A" column refers to current (NOW) ability and the "B" to proficiency expected after 2 years of nonperformance of a task.[1] A Pearson Product Moment Correlation ($\underline{r} = .655$, $p < .05$) computed between task means for IRR EAOS and active duty NOW (current proficiency) values indicated that the IRR members, while on active duty, performed job tasks at competency levels equivalent to those of current job incumbents.

For the IRR group, an overall grand mean for current proficiency was computed over all tasks for the rating. This single number indicates that considering the ET-3 job in its entirety (as reflected by the tasks used) the average IRR member feels that he could now perform tasks of the rating at a level where only occasional supervision would be needed (mean = 4.0).

For the active duty group, means reflecting proficiency on each job task for ETs working/not working in their rating were computed. These are shown in table D-11-4. Again, the expected-after-2-years data are provided for information only.

SKILL DETERIORATION

Table D-11-5 displays task proficiency means for two subgroups of the ET IRR respondents: (1) those who answered that they were now working ("W") in a field related to the Navy ET rating and (2) those who indicated that they were not working ("N") in a related field. Both EAOS and NOW (current) proficiency means are given. These means, as well as those in table D-11-4, were computed from choices of 2, 3, 4, or 5 from the answer key. These choices place proficiency along a continuum from "Need direct supervision" through "Need no supervision."

As mentioned earlier, skill deterioration is reflected by differences between EAOS proficiency and NOW proficiency. In table D-11-5, values preceded by a minus sign represent a decrease in proficiency during IRR membership: current proficiency is less than EAOS proficiency. Values with no signs indicate increases in proficiency.

The table shows that ETs who now work ("W") in a field related to their former active duty jobs actually gained proficiency on 10 of the 20 job tasks. Although the differences are not large, this "W" group also reported less skill deterioration over all other rating tasks than the "N" group. Statistical tests ($\underline{t}$ tests for independent means; see Guilford and Fruchter, 1973) indicated that over all tasks of the rating, the proficiency of the two subgroups was equivalent at EAOS ($\underline{t} = 1.655$, $\underline{p} < .0531$). Task mean proficiency values, however, differed significantly ($\underline{t} = 4.07$, $\underline{p} < .00011$) for current (NOW) proficiency.

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[1] These expected-after-2-years proficiency values were not used in subsequent analyses, however, since it was clear that many respondents did not understand the question being asked.

Table D-11-4

Task Mean Values for Two Subgroups of Active Duty ETs

	Not Working ("N")[1]		Working ("W")[2]	
Task	NOW	EXP	NOW	EXP
1	4.000	3.313	4.070	3.450
2	4.476	3.476	4.649	3.929
3	3.667	3.059	4.052	3.327
4	4.100	3.429	4.463	3.754
5	4.100	3.526	4.505	3.794
6	4.095	3.476	4.510	3.870
7	4.524	3.952	4.746	4.554
8	4.278	3.778	4.405	4.081
9	3.333	2.750	3.534	3.006
10	3.941	2.938	4.352	3.906
11	4.250	3.353	4.398	3.969
12	4.545	3.818	4.787	4.423
13	4.348	3.826	4.719	4.326
14	3.789	3.105	4.099	3.335
15	4.294	3.556	4.428	3.740
16	4.545	3.909	4.794	4.518
17	4.696	4.391	4.867	4.752
18	4.045	3.524	4.243	3.649
19	3.700	3.000	4.011	3.570
20	4.227	3.818	4.599	4.292

Composite Mean:	Group W	NOW	4.412
		EXP	3.912
	Group N	NOW	4.148
		EXP	3.500
Overall Mean:		NOW	4.280
		EXP	3.706

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[1] n = 23

[2] n = 290

Table D-11-5

Task Mean Values for Two Subgroups of IRR ETs

	Not Working ("N")[1]		Working ("W")[2]		Mean Difference	
Task	NOW	EAOS	NOW	EAOS	"N"	"W"
1	3.882	4.325	4.366	4.408	-0.443	-0.042
2	3.880	4.459	4.519	4.614	-0.579	-0.095
3	3.484	3.892	3.833	4.098	-0.408	-0.265
4	3.624	4.321	4.474	4.418	-0.697	0.056
5	3.738	4.310	4.575	4.594	-0.572	-0.019
6	3.644	4.214	4.541	4.530	-0.570	0.011
7	4.437	4.565	4.761	4.677	-0.128	0.084
8	4.256	4.408	4.468	4.476	-0.152	-0.008
9	3.233	3.623	3.575	3.842	-0.390	-0.267
10	4.056	4.236	4.344	4.235	-0.180	0.109
11	4.342	4.346	4.573	4.492	-0.004	0.081
12	4.302	4.545	4.787	4.640	-0.243	0.147
13	4.125	4.443	4.687	4.609	-0.318	0.078
14	3.855	4.337	4.044	4.378	-0.482	-0.334
15	3.890	4.525	4.333	4.530	-0.635	-0.197
16	4.318	4.605	4.706	4.712	-0.287	-0.006
17	4.730	4.764	4.889	4.744	-0.034	0.145
18	3.769	3.795	4.433	4.109	-0.026	0.324
19	3.744	4.108	4.381	4.442	-0.364	-0.061
20	4.575	4.648	4.787	4.677	-0.073	0.110

Composite Mean:	Group W	NOW	4.454
		EOS	4.461
	Group N	NOW	3.994
		EOS	4.323
Overall Mean:		NOW	4.224
		EOS	4.392

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[1] n = 90

[2] n = 138

TIME IN IRR

Table D-11-6 provides a breakdown of ET personnel by time spent in the IRR prior to mail out of the questionnaires. The table also shows mean values assigned for proficiency for 6-month intervals of IRR time and for those IRRs who have been off active duty more than 3 years. Trends in skill deterioration over time are not apparent.

Table D-11-6

Mean Proficiency Values for ET IRR Respondents by Time Since EAOS

Time (Mos.) Since EAOS	Mean	No. of Cases
0-5	3.87	22
6-11	4.26	7
12-17	4.31	17
18-23	3.66	13
24-35	4.20	21
36+	4.02	140
Overall Mean	4.03	220

COMMENTS AND OBSERVATIONS

Comments and observations on the data are offered here. As warranted, interpretations are made and discussed. These interpretations provide the basis for certain conclusions about skill deterioration and retraining needs. Our conclusions are based on best available data. However, they are subject to validation. The low questionnaire return rates coupled with the uncertain quality of the IRR data base (discussed below) require cautious inferences and limit generalizations. Nevertheless, the results do provide much useful information about the IRR that has not been available previously. They also suggest directions that should be taken with respect to the management and utilization of the IRR resource.

COMMENTS ON DATA BASE

Approximately 10 percent of questionnaires returned were classified as "nonvalid" (table D-11-1). They reflect probable errors in the IRR data base. The nonvalid category included, most prominently, questionnaires returned by the Postal Service as undeliverable (bad addresses). It also

included, but to a much smaller extent, questionnaires returned by respondents with comments such as "No longer in IRR: returned to active duty, already received final discharge. Retiree recruited from another service, was never on active duty in the Navy." (All information concerning such cases was transmitted to the Naval Reserve Personnel Center on 26 September 1985). Finally, a very few questionnaires were returned by individuals who refused to provide information and, some, by relatives marked, "Deceased." From the above data, it can be concluded that about 10 percent of the ET IRRs could not or would not be available for a mobilization call.

Questionnaires were presumably delivered by the Postal Service to a number of ETs (45 percent) from whom no information was received. It is likely that many did not respond for reasons such as those cited above--they felt the questionnaire was not applicable. A further group, of unknown size, then would also be unavailable for mobilization because they are not in the viable IRR manpower pool as is currently believed. These considerations prompt a recommendation for review and validation of the ET IRR roster.

Another data base issue that should be examined concerns the amount of time that IRR ET respondents have been away from active duty. This information is given in table D-6-6. Sixty-four percent were in the IRR for more than 3 years. Two issues emerge: (1) the need for skill upgrading and (2) availability of IRR members. Upgrade training because of new equipment, procedures, or material may be required for this group despite their beliefs (table D-11-6) in their continuing ability to perform job tasks at a fairly high level.

A second consideration concerns the Military Service Obligation (MSO). Those who are liable for a 6- or 8-year MSO (depending on when they entered on active duty) may be involuntarily recalled. Those who are beyond the MSO may only be recalled under existing agreements. If these agreements do not exist, still fewer individuals may be actually recallable for mobilization. The actual size of the available IRR manpower pool may be overestimated. Again, the recommendation is made that this data base be reviewed and validated if this is not already occurring.

SKILL DETERIORATION

Information directly pertinent to the question of skill deterioration was presented in table D-11-5. In table D-11-5, differences between mean values at EAOS and NOW (current proficiency) are shown. Values preceded by a minus sign represent skill deterioration potentially attributable to time spent in the IRR.

Approximately 61 percent of ET IRRs reported that they now work in a civilian occupation related to the ET rating and the effects of this work experience on skill deterioration will be considered next. As table D-11-5 shows, ETs who now work in a field related to their Navy rating gained proficiency on ten job tasks and also reported less skill deterioration for all other ET job tasks than the "N" subgroup. Taken over all tasks, differences between the current (NOW) proficiency means for the two subgroups were statistically significant. Also, they could not be attributed to initial differences between the groups at EAOS. Thus, civilian ET-related employment significantly affected skill deterioration. Those continuing to work in the ET field after EAOS reported less deterioration. The tasks on which the greatest amount of skill deterioration occurred are easily identifiable from table D-11-5.

TRAINING NEEDS

While skill deterioration information is of interest in its own right, the more important concern of this study is with determining the need for training IRR personnel prior to a mobilization recall. Thus, the implications of skill deterioration data must be assessed against the criterion of acceptable level of proficiency. This can be done most directly by comparing the current proficiency levels reported by ET IRRs against the levels reported by active duty ET-3s. The task means for the active duty sample can be taken as E-4 criterion performance since they reflect the level of proficiency claimed by the average ET-3 now on active duty.

The meaning of specific numerical values reported for task means must be clearly understood before conclusions about skill deterioration or training needs can be addressed. Attention is directed to the "answer key" shown on either table D-11-2 or D-11-3. The answer key shows that a value of "4," for example, represents skilled performance with only a need for occasional supervision. Following conventional practice, we assume that a "4" is reflected by any values between 3.50 and 4.49. A "3" is interpreted similarly. Skill deterioration may be shown by lower mean values for NOW (i.e., current) versus EAOS proficiency. However, the change from EAOS scores may not be sufficient to move the IRR respondents to a lower proficiency category. For example, skill loss on tasks 14 and 15 occurred for the IRRs working in a related field. However, the losses reported resulted in the IRRs remaining in the "4" category (see table D-11-5). We would conclude that the deterioration is of no consequence insofar as signaling a need for retraining.

Assessment of the need for training IRR personnel to support mobilization should proceed with the application of similar logic. Table D-11-7 below presents the task mean values reported for current proficiency by IRR personnel who are not working in a field related to the ET rating and also for those who are working in a related field. These values are from table D-11-5. Task proficiency means for active duty personnel working in their rating (taken from table D-11-4) are also shown in table D-11-7. Inspection of the data shows that all values are essentially "4"s. Hence, from these data alone, a fair conclusion is that training of ET IRRs would not be required before mobilization to bring proficiency to an acceptable level.

From our assessment, there seems to be no need for extensive retraining or maintenance training of ETs prior to a mobilization recall. The average IRR ET should be able to perform required job tasks at an appropriate level of competency with a modicum of refamiliarization at mobilization. For the most part, this could probably be given by close, corrective supervision while the returnee is performing job tasks. This conclusion pertains to all

ETs but is probably especially relevant to the 61 percent of IRR ETs who continue to work in an ET-related occupation.

Table D-11-7

Task Mean Proficiency Values for IRR and Active Duty ETs

	IRR		Active Duty
Tasks	Not in Field	In Field	In Rating
1	3.9	4.4	4.1
2	3.9	4.5	4.6
3	3.5	3.8	4.1
4	3.6	4.5	4.5
5	3.7	4.6	4.5
6	3.6	4.5	4.5
7	4.4	4.8	4.7
8	4.3	4.5	4.4
9	3.2	3.6	3.5
10	4.1	4.3	4.4
11	4.3	4.6	4.4
12	4.3	4.8	4.8
13	4.1	4.7	4.7
14	3.9	4.0	4.1
15	3.9	4.3	4.4
16	4.3	4.7	4.8
17	4.7	4.9	4.9
18	3.8	4.4	4.2
19	3.7	4.4	4.0
20	4.6	4.8	4.6

An additional factor to consider in assessing needs for training, however, concerns time since EAOS. Sixty-four percent of the ET IRRs in the sample were away from active duty for more than 3 years (see table D-11-6). Subject matter experts who review the data provided here may determine that skill upgrade training is required because of technical changes (e.g., new equipment, materials, procedures) in the field.

VALIDATION OF DATA

Our analyses indicate that the need for training of ET IRRs against mobilization requirements is not great. It would appear that required proficiency (i.e., the level shown by current job incumbents) can for the most part be achieved by familiarization training under direct corrective supervision in quite short time periods for most job tasks. There are no indications that comprehensive retraining for all rating tasks, such as would be provided in a formal school setting (e.g., "A" School), is needed. At worst case, instructional modules for training prospective ET returnees on given individual tasks may be required. Information not readily available to the project staff is needed, however, for firm decisions about the need for training to bring prospective IRR returnees to an acceptable level of proficiency or to maintain their skills at a defined level. We recommend that the information provided by this report be evaluated/validated against a number of other considerations. Resource sponsors would be appropriate to validate training needs.

Data Review

As noted previously, the conclusions generated by the project staff are considered tentative and subject to verification. Generalizations from the data have also been limited because of the small numbers of questionnaires returned and because of suspected IRR data base inadequacies. It is believed, however, that much useful information can be gleaned from the descriptive summaries provided. Most of this information has not previously been available because of the many difficulties inherent in conducting skill deterioration research and restrictions on methods that can be used because of practical considerations. Maximum exploitation of the information that is now available is in order. A complete and accurate assessment of the meaning and action implications of the data should be made by individuals who are thoroughly knowledgeable of technical requirements of the ET rating. The NAVTRASYSCEN, if requested, could assist SMEs in this effort. Areas to be considered in the review/validation process are discussed next.

Review Areas

For our study, SMEs from the Service School Command, Naval Training Center, Great Lakes, IL, identified the job tasks they thought would be appropriate for returning IRR ET members to perform. Other SMEs may not agree on the list. Resource sponsors should determine if these are indeed the job tasks that an IRR returnee (at mobilization) should be able to perform. Further, a companion decision is required concerning the acceptability of the reported level of competency. Since active duty personnel report that they, on the average, now perform at these levels, these data reflect E-4 criterion performance. Resource sponsors should consider whether less proficiency would be acceptable. If so, attendant training requirements for IRRs with concomittant resource requirements would be lessened. On judging the need for training, task criticality, in terms of personnel or equipment safety as it interacts with recent changes to material, procedures, or equipment, must also be considered.

An additional decision factor concerns plans for utilization of IRR personnel at mobilization. If these individuals will serve as casualty replacements, then a fairly high level of proficiency at recall is desirable. Training, as determined by the study data and by the resource sponsor, should occur prior to recall. If, however, IRR members will replace current active duty personnel in less demanding assignments, then time would be available for receiving units or some especially chartered intermediate activity to provide needed training. Likely, the bulk of this training could be done either on the job or in on-the-job type conditions where IRR returnees could demonstrate their ability to perform job tasks under close, corrective supervision. It is our belief, based on available data that desired proficiency would be achieved relatively quickly on most tasks. Further, while decisions must still be made concerning formal training, either institutional or via OJT, our belief is that this type of training can be limited.

Finally, based on (1) the IRR members' reports of their current relatively high residual levels of proficiency and (2) literature findings that maximum skill loss occurs after about 1 year of nonuse of skills, it appears that skill maintenance training for ETs is not strictly necessary. Again, however, this conclusion must be weighed against planned utilization of recalled IRR members. For example, a casualty replacement scenario would make maintenance training more desirable than other scenarios.

CONCLUSIONS

1. Mobilization planners should be aware that the size of the ET IRR manpower pool may be smaller than believed. Approximately 10 percent of the pool may not be contactable by mail. An additional segment of unknown size may have already reenlisted and/or not be useful to the Navy for other reasons. A substantial percentage of ETs listed in IRR files could also be beyond the zone of involuntary recall.

2. ET IRR personnel who work in civilian occupations related to their ET rating reported less deterioration of skills than ETs who are not similarly employed.

3. Comprehensive retraining and maintenance training for all IRR ETs appear to be unnecessary to support mobilization. Familiarization training, at recall, consisting of supervised practice may suffice. This conclusion is subject to concurrence by subject matter expert ETs.

4. ET personnel off active duty for greater than 3 years may require training on selected tasks because of the volatility of the field to update skills despite their reported continuing high proficiency levels.

5. Of the 20 ET job tasks for which skill deterioration was assessed, indications are that none will require any concerted training for returning skills to an acceptable level of proficiency prior to mobilization recall.

6. For all ET IRRs, mean values of current proficiency reported compare favorably with those reported by active duty personnel. This finding also suggests minimal needs for retraining.

RECOMMENDATIONS

1. Review, update, and validate the IRR data base content to assure that accurate assessments of the size of the IRR manpower pool are available at all times. Take whatever other steps are necessary and available to assure continuous updating of the data base.

2. Amend existing procedures where possible to obtain information from IRR members concerning civilian employment. At the very least, obtain this information from those eligible for or receiving bonuses for continued IRR service. Consider these individuals as first choice for mobilization recall.

3. Request resource sponsors review the data of this study. Determine if agreement can be reached that the tasks generated by schoolhouse SMEs adequately represent the ET-3 job. Determine that the ET-3 job is, in fact, acceptable as the target performance level for training to support mobilization. Request resource sponsors consider the data of this study against factors such as changes to materials, procedures, equipment used by the rating, criticality of task performance, and mobilization plans for IRR personnel.

4. Consider recalling a sample of ET IRRs to assess their knowledge of current ET-3 job requirements. Use this information to validate the data and conclusions of this study.

APPENDIX D

ANNEX 12

FIRE CONTROL TECHNICIAN (SURFACE MISSILE) (FTM): SKILL DETERIORATION DURING NAVY INDIVIDUAL READY RESERVE (IRR) MEMBERSHIP

INTRODUCTION

Following a first-tour of active duty, Naval personnel who do not elect other reserve options are assigned to the Individual Ready Reserve (IRR) to complete a specified Military Service Obligation (MSO); other personnel may voluntaril enlist in the IRR. IRR members, typically in a nonpay, nondrill status, are subject to recall to active duty if mobilization of the Armed Forces is ordered. A major concern of mobilization planners is that the skills acquired on active duty may deteriorate over time under the IRR condition of nonuse. This raises the question of the contribution that can be made by recalled IRR service members. To determine the extent and nature of skill deterioration during IRR membership, the Naval Training Systems Center (NAVTRASYSCEN), Code 10, conducted an assessment study. The study was performed at the request of the Chief of Naval Operations (OP-01R1).

This study assessed skill deterioration for 16 critical Navy ratings identified by OP-01. The designation "critical" was based on the criterion of projected personnel shortfalls for mobilization. The Fire Control Technician (Surface Missile) (FTM) rating was one of these 16 critical ratings. (This rating is now subsumed under the general "FC" designation.)

PURPOSE OF THE STUDY

The purpose of the study was to assess skill deterioration during IRR membership and determine needs for training IRR personnel to restore, upgrade, or maintain their skills at minimum proficiency levels to support mobilization. Implicit in the tasking was the additional requirement to define minimum, or acceptable, proficiency.

In a general sense, acceptable proficiency refers to the ability of a recalled ready reservist to make an effective contribution to a receiving unit's mission. In a more specific sense, it refers to ability to perform a defined set of job tasks at a defined level of competency. Performance proficiency information was essential to establish a baseline around which obtained skill deterioration information could be assessed and to define the terminal performance goals that any proposed training regimen should attempt to achieve.

APPROACH

Complete details of the technical approach to the study are presented in the main body of this report. A brief description is presented here.

Mail-out questionnaires were used to obtain information. Four senior enlisted FTMs, assigned to the Service School Command, Naval Training Center, Great Lakes, IL., served as subject matter experts (SME) for questionnaire development. Under guidance given by the project staff, the FTM SMEs selected from various source materials a set of job tasks that, in their judgment, best represented the job (non-NEC specific) of an active duty FTM-3. This level was chosen in the belief that a recalled ready reservist who could perform FTM job tasks competently at the E-4 level would make a positive work contribution to a receiving unit.

The FTM-3 job task statements were used on questionnaires mailed to IRR and active duty personnel. Information sought concerned tasks performed and the level of competency attached to the performance of each. Level of competency was defined in terms of the amount of supervision needed to perform specific job tasks.

Questionnaires mailed to IRR personnel requested information about proficiency on each job task at the End of Active Obligated Service (EAOS) and at the present time (NOW). The difference between proficiency at EAOS and current proficiency would reflect skill deterioration during IRR membership.

Questionnaires mailed to active duty FTM-3s requested information about current proficiency on job tasks and proficiency expected after 2 years of nonperformance of the job tasks. The current proficiency estimates were needed to define criterion job performance for an active duty FTM-3. The data reflecting what is currently done on the job would define an acceptable level of performance. These data could be used as a baseline for judging amount and consequences of IRR skill deterioration. Copies of the data collection instruments are shown in the next section.

As of 25 September 1984, 219 FTMs were listed in Naval Military Personnel Command (NAVMILPERSCOM) computer files as assigned to the IRR. Names and addresses were obtained from NAVMILPERSCOM through the Naval Reserve Personnel Center (NAVRESPERSCEN). Questionnaires were mailed under CNO (OP-11) cover letter on 31 December 1984 to the population of 219. Because of a low initial return rate, a follow-up mailing (168) was made on 29 January 1985. Questionnaire returns were accepted until 28 February 1985.

Coordination with Commander in Chief, U.S. Atlantic Fleet (CINCLANTFLT), Commander in Chief, U.S. Pacific Fleet (CINCPACFLT), and within CNO (OP-01) was accomplished for authorization to survey active duty FTM-3 personnel. An FTM-3 roster, current as of 2 August 1985, was obtained from NAVMILPERSCOM. From a pool of 1,308, a sample of 378 FTM-3s was determined using accepted survey research methods. Questionnaires were mailed on 18 September 1985 under CNO (OP-11) cover letter to unit/activity commanding officers for distribution to FTM-3s named. Returns were accepted until 31 December 1985. Returned questionnaires were scanned to determine data usability, and data were entered into computer files. Subsequently, summaries of the information of interest to the study were prepared.

RESULTS

Results pertinent to the assessment of FTM skill deterioration are presented in this section.

QUESTIONNAIRE RETURN STATISTICS

Table D-12-1 shows, for both the IRR and active duty FTMs, the number of questionnaires mailed and number and percent of usable returns. For the IRR sample, the number/percent of nonvalid returns (nonvalid principally because of data base errors) is also shown. Percent usable returns was derived by dividing the number returned (73) by the number delivered (i.e., 219 - 17 = 202).

Table D-12-1

Questionnaire Return Statistics

Sample	No. Mailed	Usable Returns No.	Usable Returns %	Nonvalid No.	Nonvalid %
IRR	219	73	36	17	7.8
Active Duty	378	260	69		

QUESTIONNAIRE DATA SUMMARIES

Summaries of data obtained from the questionnaires are presented in table D-12-2 for IRR personnel and in table D-12-3 for active duty personnel. The tables are modified questionnaire forms.

Background Questions

Of 69 IRR FTMs answering the question, 38 (approximately 55 percent) reported that they now work in a civilian occupation related to their Navy FTM rating. Answers to the remaining two background questions for IRRs (see table D-12-2) are not reported since it was determined that the answers might be redundant and could not be unambiguously interpreted. Of the active duty respondents answering the background questions (see table D-12-3), 247 of 255 (97 percent) work in rating. Two hundred and forty-seven (96 percent) are assigned shore duty.

Task Performance Data

The data summary tables (D-12-2 and D-12-3) show the number (F) and percent (%) of respondents reporting that they had never performed particular job tasks (i.e., they responded to the task description with a "1.") For IRRs, these data refer to the "at EAOS" answers and for active duty to the current (NOW) level of ability. A rank-order correlation (see Siegel, 1956) computed between the two sets of data ($r = .895$, $p < .05$) indicated significant agreement between the two classes of respondents. Thus, tasks which have not been performed by active duty FTMs (to date) are the same tasks that had not been performed by IRRs at EAOS.

Tables D-12-2 and D-12-3 also show, for each task listed on a questionnaire, mean values for performance proficiency/competency, the standard deviation (SD) around the mean, and the number of cases (n) on which a mean is based. For the IRR sample, table D-12-2, the "A" column reflects current average ability level; the "B" column, EAOS average ability level. For the

Table D-12-2

Overall Summary of FTM IRR Questionnaire Data

PART 1:

1. If necessary, correct your Service Number.
2. Is the work which you do NOW related to your Navy rating?
   Yes 38 No 31
3. Have you done PREVIOUS work which is related to your Navy rating since your Expiration of Active Obligated Service (EAOS)?
   Yes - No -
4. Have you received training related to your Navy rating since your Expiration of Active Obligated Service (EAOS)?
   Yes - No -

ANSWER KEY:

(1) Have never performed the task.

(2) Can/could do simple parts of the task (need direct supervision).

(3) Can/could do most parts of the task (need general supervision).

(4) Can/could do all parts of the task (need only occasional supervision. Meets minimum local speed and accuracy standards.)

(5) Can/could do complete task quickly and accurately (need no supervision).

PART 2:

For each job task statement below:

A. Indicate your CURRENT level of ability according to the answer key above.

B. Estimate your PREVIOUS level of ability at the time of your EAOS according to the answer key above.

"(1)" Choices				A			B	
F	%	Tasks	N	Mean	SD	N	Mean	SD
7	10.0	1. Test and align radar indicating circuits.	69	3.22	1.293	70	3.93	1.300
1	1.4	2. Repair or replace electrical/ electronic components and parts.	71	4.27	1.082	72	4.58	.818
5	6.9	3. Test high power RF amplifier filament voltage and high voltage protective circuits.	71	3.38	1.324	72	3.99	1.228
5	6.9	4. Test and adjust radar power supplies.	71	3.65	1.405	72	4.24	1.157
1	1.4	5. Use general purpose test equipment.	72	4.47	.978	72	4.63	.759
2	2.8	6. Test weapons control equipment for continuity, grounds, and shorts.	72	4.19	1.182	72	4.56	.837
3	4.2	7. Inspect and maintain rotating machinery.	72	4.06	1.209	72	4.29	1.041

Table D-12-2 (Continued)

2	2.8	8. Repair electrical/electronic cables and connectors.	72	4.36	1.039	72	4.42	1.031
11	15.5	9. Prepare computer for all modes of operations.	71	3.17	1.414	71	3.47	1.433
21	29.2	10. Load operational and diagnostic programs in digital computers.	72	3.21	1.635	72	3.28	1.713
2	2.8	11. Use block diagrams, schematics, logic and wiring diagrams.	72	4.13	1.150	72	4.40	1.030
1	1.4	12. Read dials and indicators.	72	4.60	.867	72	4.74	.692
2	2.8	13. Perform systems operability tests on weapons control/fire control equipment.	72	3.63	1.283	72	4.42	.960
12	16.7	14. Operate weapons direction/designation systems including recognition of ECM signals.	72	3.00	1.332	72	3.54	1.414
18	25.4	15. Energize stable elements.	71	2.79	1.453	71	3.16	1.537
10	14.3	16. Operate missile test and readiness	71	3.20	1.527	70	3.91	1.422
14	19.7	17. Verify benchmark reading, tram element, and record data.	71	2.92	1.528	71	3.44	1.500
14	19.7	18. Operate Target Designation Transmitters (TDT).	71	3.27	1.630	71	3.73	1.585
15	20.8	19. Clean and test optical equipment.	72	3.21	1.528	72	3.54	1.565
1	1.4	20. Clean and lubricate mechanical and/or electro-mechanical assemblies.	72	4.13	1.150	72	4.60	.816
2	2.8	21. Use and maintain handtools.	72	4.74	.712	72	4.76	.778
8	11.1	22. Inspect liquid coolant systems.	72	3.85	1.469	72	4.19	1.307
19	27.1	23. Measure low pressure dry air systems.	71	3.07	1.685	70	3.43	1.664
		24. What class ship(s) were you on?						
		Overall Mean:		3.68				

Table D-12-3

Overall Summary of FTM Active Duty Questionnaire Data

PART 1:

1. If necessary, correct your Service Number.
2. Does your current billet require you to work in your Navy rating?
   Yes 247 No 8
3. What type duty is your current billet?
   Sea 9 Shore 247

ANSWER KEY:

(1) Have never performed the task.

(2) Can/could do simple parts of the task (need direct supervision).

(3) Can/could do most parts of the task (need general supervision).

(4) Can/could do all parts of the task (need only occasional supervision. Meets minimum local speed and accuracy standards.)

(5) Can/could do complete task quickly and accurately (need no supervision).

PART 2:

For each job task statement below:

A. Use the answer key above to indicate your CURRENT level of ability.

B. Use the answer key above to estimate your EXPECTED level of ability after 2 years of not performing these tasks.

"(1)" Choices			A			B		
F	%	Tasks	N	Mean	SD	N	Mean	SD
39	15.1	1. Test and align radar indicating circuits.	258	3.58	1.373	251	2.97	1.193
2	.8	2. Repair or replace electrical/ electronic components and parts.	260	4.57	.745	257	4.04	1.003
21	8.1	3. Test high power RF amplifier filament voltage and high voltage protective circuits.	259	3.94	1.206	256	3.33	1.241
19	7.3	4. Test and adjust radar power supplies.	259	4.28	1.201	256	3.81	1.267
2	.8	5. Use general purpose test equipment.	260	4.74	.609	256	4.27	.863
5	1.9	6. Test weapons control equipment for continuity, grounds, and shorts.	259	4.52	.832	256	4.08	1.028
15	5.8	7. Inspect and maintain rotating machinery.	257	4.22	1.101	254	3.71	1.206

Table D-12-3 (Continued)

12	4.7	8.	Repair electrical/electronic cables and connectors.	258	4.19	1.081	252	3.87	1.194
39	15.1	9.	Prepare computer for all modes of operations.	258	3.51	1.458	253	2.97	1.275
57	22.1	10.	Load operational and diagnostic programs in digital computers.	258	3.47	1.632	250	3.06	1.405
1	.4	11.	Use block diagrams, schematics, logic and wiring diagrams.	259	4.60	.721	256	4.05	.963
1	.4	12.	Read dials and indicators.	260	4.89	.420	255	4.60	.756
9	3.5	13.	Perform systems operability tests on weapons control/fire control equipment.	260	4.37	.991	255	3.55	1.078
74	28.6	14.	Operate weapons direction/designation systems including recognition of ECM signals.	259	3.02	1.522	252	2.51	1.286
124	47.7	15.	Energize stable elements.	260	2.67	1.726	247	2.41	1.506
114	44.4	16.	Operate missile test and readiness	257	2.73	1.714	244	2.43	1.381
105	40.7	17.	Verify benchmark reading, tram element, and record data.	258	2.64	1.585	250	2.41	1.354
103	39.6	18.	Operate Target Designation Transmitters (TDT).	260	2.99	1.775	251	2.75	1.568
94	36.2	19.	Clean and test optical equipment.	260	3.11	1.759	252	2.93	1.610
5	1.9	20.	Clean and lubricate mechanical and/or electro-mechanical assemblies.	260	4.55	.835	256	4.10	1.038
2	.8	21.	Use and maintain handtools.	260	4.91	.430	257	4.80	.583
43	16.5	22.	Inspect liquid coolant systems.	260	3.97	1.477	252	3.61	1.386
72	28.1	23.	Measure low pressure dry air systems.	256	3.42	1.644	249	3.15	1.478
		24.	What class ship(s) were you on?						

active duty sample (table D-12-3), the "A" column refers to current (NOW) ability and the "B" to proficiency expected after 2 years of nonperformance of a task.[1]. A Pearson Product Moment Correlation ($r = .905$, $p < .05$) computed between task means for IRR EAOS and active duty NOW (current proficiency) values indicates that the IRR members, while on active duty, performed job tasks at competency levels equivalent to those of current job incumbents.

For the IRR group, an overall grand mean for current proficiency was computed over all tasks for the rating. This single number indicates that considering the FTM-3 job in its entirety (as reflected by the tasks used) the average IRR member feels that he could now perform tasks of the rating at a level where only occasional supervision would be needed (mean = 3.68).

For the active duty group, means reflecting proficiency on each job task for FTMs working/not working in their rating were computed. These are shown in table D-12-4. Again, the expected-after-2-years data are provided for information only.

SKILL DETERIORATION

Table D-12-5 displays task proficiency means for two subgroups of the FTM IRR respondents: (1) those who answered that they were now working ("W") in a field related to the Navy FTM rating and (2) those who indicated that they were not working ("N") in a related field. Both EAOS and NOW (current) proficiency means are given. These means, as well as those in table D-12-4, were computed from choices of 2, 3, 4, or 5 from the answer key. These choices place proficiency along a continuum from "Need direct supervision" through "Need no supervision."

As mentioned earlier, skill deterioration is reflected by differences between EAOS proficiency and NOW proficiency. In table D-12-5, values preceded by a minus sign represent a decrease in proficiency during IRR membership: current proficiency is less than EAOS proficiency. Values with no signs indicate increases in proficiency.

The table shows that FTMs who now work ("W") in a field related to their former active duty jobs gained proficiency on 6 of the 23 job tasks rated. This group also reported less skill deterioration over all but one of the other rating tasks than the "N" subgroup. Statistical tests (t tests for independent means; see Guilford and Fruchter, 1973) indicated that over all tasks of the FTM rating, the proficiency of the two subgroups was equivalent at EAOS ($t = 1.30$, $p < .1002$). Task mean proficiency values differed significantly ($t = 4.176$, $p < .000069$) on current (NOW) proficiency.

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[1] These expected-after-2-years proficiency values were not used in subsequent analyses, however, since it was clear that many respondents did not understand the question being asked.

Table D-12-4

Task Mean Values for Two Subgroups of Active Duty FTMs

	Not Working ("N")[1]		Working ("W")[2]	
Task	NOW	EXP	NOW	EXP
1	4.143	3.286	4.029	3.252
2	4.750	4.375	4.596	4.045
3	4.250	3.625	4.187	3.536
4	4.286	4.167	4.544	4.013
5	4.714	4.429	4.768	4.272
6	4.625	4.000	4.593	4.169
7	4.375	3.875	4.428	3.893
8	4.625	4.125	4.348	4.004
9	3.000	2.857	3.981	3.302
10	4.143	3.571	4.147	3.464
11	4.750	4.250	4.624	4.092
12	5.000	4.875	4.902	4.618
13	4.750	4.125	4.475	3.649
14	4.000	3.500	3.822	3.040
15	4.429	4.143	4.198	3.516
16	4.750	4.000	4.083	3.309
17	3.857	3.375	3.776	3.204
18	4.000	3.286	4.331	3.743
19	4.800	4.333	4.279	3.813
20	4.625	4.250	4.612	4.169
21	5.000	4.875	4.935	4.826
22	5.000	4.500	4.544	3.990
23	4.143	3.750	4.372	3.736

Composite Mean:	Group W	NOW	4.373
		EXP	3.811
	Group N	NOW	4.435
		EXP	3.981
Overall Mean:		NOW	4.404
		EXP	3.896

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[1] n = 8

[2] n = 247

Table D-12-5

Task Mean Values for Two Subgroups of IRR FTMs

	Not Working ("N")[1]		Working ("W")[2]		Mean Difference	
Task	NOW	EAOS	NOW	EAOS	"N"	"W"
1	3.143	4.103	3.818	4.382	-0.960	-0.564
2	3.774	4.563	4.842	4.692	-0.789	0.150
3	3.167	4.100	4.152	4.297	-0.933	-0.145
4	3.483	4.448	4.515	4.500	-0.965	0.015
5	4.129	4.625	4.923	4.718	-0.496	0.205
6	4.097	4.548	4.622	4.744	-0.451	-0.122
7	4.097	4.355	4.351	4.500	-0.258	-0.149
8	4.031	4.531	4.718	4.500	-0.500	0.218
9	3.045	3.917	3.946	3.917	-0.872	0.029
10	3.645	4.059	4.167	4.294	-0.414	-0.127
11	3.633	4.129	4.744	4.795	-0.496	-0.051
12	4.438	4.781	4.821	4.795	-0.343	0.026
13	3.552	4.516	4.108	4.513	-0.964	-0.405
14	3.037	4.034	3.697	4.065	-0.997	-0.368
15	3.391	3.880	3.571	3.893	-0.489	-0.322
16	3.440	4.385	3.969	4.412	-0.945	-0.443
17	3.318	3.885	3.833	4.161	-0.567	-0.328
18	4.000	4.370	4.172	4.433	-0.370	-0.261
19	3.889	4.370	3.793	4.067	-0.481	-0.274
20	3.967	4.531	4.487	4.744	-0.564	-0.257
21	4.750	4.875	4.821	4.868	-0.125	-0.047
22	4.333	4.643	4.382	4.556	-0.310	-0.174
23	3.947	4.143	4.250	4.467	-0.196	-0.217

Composite Mean:	Group W	NOW	4.291
		EOS	4.448
	Group N	NOW	3.752
		EOS	4.339
Overall Mean:		NOW	4.022
		EOS	4.394

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[1] n = 31
[2] n = 38

TIME IN IRR

Table D-12-6 provides a breakdown of FTM personnel by time spent in the IRR prior to mail out of the questionnaires. The table also shows mean values assigned for proficiency for 6-month intervals of IRR time, and for IRRs off active duty more than 3 years. These mean values are shown for information only, since the number of individuals in each group is too small to permit meaningful quantitative interpretation.

Table D-12-6

Mean Proficiency Values for FTM IRR Respondents by Time Since EAOS

Time (Mos.) Since EAOS	Mean	No. of Cases
0-5	4.05	9
6-11	3.17	4
12-17	3.66	7
18-23	4.17	6
24-35	3.79	12
36+	3.49	27
Overall Mean	3.68	65

COMMENTS AND OBSERVATIONS

Comments and observations on the data are offered here. As warranted, interpretations are made and discussed. These interpretations provide the basis for certain conclusions about skill deterioration and retraining needs. Our conclusions are based on best available data. However, they are subject to validation. The low questionnaire return rate coupled with the uncertain quality of the IRR data base (discussed below) require cautious inferences and limit generalizations. Nevertheless, the results do provide much useful information about the IRR that has not been available previously. They also suggest directions that should be taken with respect to the management and utilization of the IRR resource.

COMMENTS ON DATA BASE

Approximately 8 percent of questionnaires returned were classified as "nonvalid" (table D-12-1). They reflect probable errors in the IRR data base. The nonvalid category included, most prominently, questionnaires returned by the Postal Service as undeliverable (bad addresses). It also included, but to a much smaller extent, questionnaires returned by respondents with comments such as: "No longer in IRR, returned to active duty, already received final discharge. Retiree recruited from another service, was never on active duty in the Navy." (All information concerning such cases was transmitted to the Naval Reserve Personnel Center on 26 September 1985.) Finally, a very few questionnaires were returned by individuals who refused to provide information and, some, by relatives marked, "Deceased." From the above data, it can be concluded that about 8 percent of the FTM IRRs could not or would not be available for a mobilization call. This can probably be considered as an acceptable percentage.

Questionnaires were presumably delivered by the Postal Service to a number of FTMs (64 percent) from whom no information was received. It is likely that many did not respond for reasons such as those cited above--they felt the questionnaire was not applicable. A further group, of unknown size, then would also be unavailable for mobilization because they are not in the viable IRR manpower pool as is currently believed. These considerations prompt a recommendation for review and validation of the FTM IRR roster.

Another data base issue that should be examined concerns the amount of time that FTM respondents have been away from active duty. This information is given in table D-12-6. Forty-two percent were in the IRR for more than 3 years. Two issues emerge: (1) the need for skill upgrading and (2) availability of IRR members. Upgrade training because of new equipment, procedures, or material may be required for this group despite their beliefs (table D-12-6) in their ability to perform job tasks at an acceptable level. FTM SMEs must make this determination, however, based on changes to how the job is now performed.

A second consideration concerns the Military Service Obligation (MSO). Those who are liable for a 6- or 8-year MSO (depending on when they entered on active duty) may be involuntarily recalled. Those who are beyond the MSO may only be recalled under existing agreements. If these agreements do not exist, still fewer individuals may be actually recallable for mobilization. The size of the available IRR manpower pool may be overestimated. Again, the recommendation is made that this data base be reviewed and validated if this is not already occurring.

SKILL DETERIORATION

Information directly pertinent to the question of skill deterioration was presented in table D-12-5. In table D-12-5, differences between mean values at EAOS and NOW (current proficiency) are shown. Values preceded by a minus sign represent skill deterioration potentially attributable to time spent in the IRR.

Approximately 55 percent of FTM IRRs reported that they now work in a civilian occupation related to the FTM rating and the effects of this work experience on skill deterioration will be considered next. As table D-12-5 shows, FTMs who now work ("W") in a field related to their Navy rating gained proficiency on 6 of the 23 job tasks. They also reported less skill deterioration than the "N" subgroup for all but one of the other FTM job tasks. Taken over all tasks, differences between the current (NOW) proficiency means for the two subgroups were statistically significant. Also, they could not be attributed to initial differences between the groups at EAOS. Thus, civilian FTM-related employment significantly affected skill deterioration. Those continuing to work in the FTM field after EAOS reported less deterioration. The tasks on which the greatest amount of skill deterioration occurred are easily identifiable from table D-12-5.

TRAINING NEEDS

While skill deterioration information is of interest in its own right, the more important concern of this study is with determining the need for training IRR personnel prior to a mobilization recall. Thus, the implications of skill deterioration data must be assessed against the criterion of acceptable level of proficiency. This can be done most directly by comparing the current proficiency levels reported by FTM IRRs against the levels reported by active duty FTM-3s. The task means for the active duty sample can be taken as E-4 criterion performance since they reflect the level of proficiency claimed by the average FTM-3 now on active duty.

The meaning of specific numerical values reported for task means must be clearly understood before conclusions about skill deterioration or training needs can be addressed. Attention is directed to the "answer key" shown on either table D-12-2 or D-12-3. The answer key shows that a value of "4," for example, represents skilled performance with only a need for occasional supervision. Following conventional practice, we assume that a "4" is reflected by any values between 3.50 and 4.49. A "3" is interpreted similarly. Skill deterioration may be shown by lower mean values for NOW (i.e., current) versus EAOS proficiency. However, the change from EAOS scores may not be sufficient to move the IRR respondents to a lower proficiency category. For example, skill loss on tasks 13 to 23 occurred for the IRRs working in a related field. However, the losses reported resulted in the IRRs remaining in the "4" category (see table D-12-5). We would conclude that the deterioration is of no consequence insofar as signaling a need for retraining.

Assessment of the need for training IRR personnel to support mobilization should proceed with the application of similar logic. Table D-12-7 below presents the task mean value reported for current proficiency by IRR personnel who are not working in a field related to the FTM rating and also for those who are working in a related field. These values are from table D-12-5. Task proficiency means for active duty personnel working in their rating (taken from table D-12-4) are also shown in table D-12-7. Inspection of the data shows that all values are essentially "4"s for FTM IRRs working in a related field. For IRR FTMs not working in a related field, 16 of the 23 job tasks are "4"s. Hence from these data alone, a fair conclusion is that training of FTM IRRs working in a related field would not be required before mobilization to bring proficiency to an acceptable level. On the other hand, training of FTM IRRs not working in a related field would be recommended before mobilization.

From our assessment, the current level of proficiency differs for FTM IRRs working/not working in a related field. There seems to be no need for extensive retraining or maintenance training of FTMs working in the field. In this case, the average IRR FTM should be able to perform required job tasks at an appropriate level of competency with a modicum of refamiliarization at mobilization. For the most part, this could probably be given by close, corrective supervision while the returnee is performing job tasks.

The picture is different for FTM IRRs not working in the field. The average IRR FTM should not be able to perform almost a third of the required job tasks at mobilization. These FTMs should receive refresher training emphasizing the tasks identified in table D-12-7. A specialized curriculum using the data of this study to identify training emphasis areas is recommended for development.

Table D-12-7

Task Mean Proficiency Values for IRR and Active Duty FTMs

	IRR		Active Duty
Tasks	Not in Field	In Field	In Rating
1	3.1*	3.8	4.0
2	3.8	4.8	4.6
3	3.2*	4.2	4.2
4	3.5	4.5	4.5
5	4.1	4.9	4.8
6	4.1	4.6	4.6
7	4.1	4.4	4.4
8	4.0	4.7	4.3
9	3.0*	3.9	4.0
10	3.6	4.2	4.1
11	3.6	4.7	4.6
12	4.4	4.8	4.9
13	3.6	4.1	4.5
14	3.0*	3.7	3.8
15	3.4*	3.6	4.2
16	3.4*	4.0	4.1
17	3.3*	3.8	3.8
18	4.0	4.2	4.3
19	3.9	3.8	4.3
20	4.0	4.5	4.6
21	4.8	4.8	4.9
22	4.3	4.4	4.5
23	3.9	4.3	4.4

*Probable training needs.

An additional factor to consider in assessing needs for training concerns time since EAOS. Forty-two percent of the FTM IRRs in the sample were away from active duty for more than 3 years (see table D-12-6). Subject matter experts who review the data provided here may determine that skill upgrade training is required because of technical changes (e.g., new equipment, materials, procedures) in the field. These upgrade training needs could also be incorporated into a specialized mobilization curriculum.

VALIDATION OF DATA

Our analyses indicate that there is a need for training some FTM IRRs to support mobilization. Formal refresher training appears to be the best solution for FTMs who do not work in jobs related to the FTM rating.

For those who do work in a related job, it would appear that required proficiency (i.e., the level shown by current job incumbents) can for the most part be achieved by familiarization training under direct corrective supervision in quite short time periods for most job tasks. There is no indication that comprehensive retraining for all rating tasks, such as would be provided in a formal school setting (e.g., "A" school), is needed. At worst case, instructional modules for training FTM returnees (who have been working in the field) on given individual tasks may be required.

Information not readily available to the project staff is needed for firm decisions about the need for training to bring prospective IRR returnees to an acceptable level of proficiency or to maintain their skills at a defined level. We recommend that the information provided by this report be evaluated/validated against a number of other considerations. Resource sponsors would be appropriate to validate training needs.

Data Review

As noted previously, the conclusions generated by the project staff are considered tentative and subject to verification. Generalizations from the data have also been limited because of the small numbers of questionnaires returned and because of suspected IRR data base inadequacies. It is believed, however, that much useful information can be gleaned from the descriptive summaries provided. Most of this information has not previously been available because of the many difficulties inherent in conducting skill deterioration research and restrictions on methods that can be used because of practical considerations. Maximum exploitation of the information that is now available is in order. A complete and accurate assessment of the meaning and action implications of the data should be made by individuals who are thoroughly knowledgeable of technical requirements of the FTM rating. The NAVTRASYSCEN, if requested, could assist SMEs in this effort. Areas to be considered in the review/validation process are discussed next.

Review Areas

For our study, SMEs from Service School Command, Naval Training Center, Great Lakes, IL, identified the job tasks they thought would be appropriate for returning IRR FTM members to perform. Other SMEs may not agree on the list. Resource sponsors should determine if these are indeed the job tasks that an IRR returnee (at mobilization) should be able to perform. Further, a companion decision is required concerning the acceptability of the reported level of competency. Since active duty personnel report that they, on the average, now perform at these levels, these data reflect E-4 criterion performance. Resource sponsors should consider whether less proficiency would be acceptable. If so, attendant training requirements for IRRs with concomittant resource requirements would be lessened. On judging the need for training, task criticality, in terms of personnel or equipment safety as it interacts with recent changes to material, procedures, or equipment, must also be considered.

An additional decision factor concerns plans for utilization of IRR personnel at mobilization. If these individuals will serve as casualty replacements, then a fairly high level of proficiency at recall is desirable. Training, as determined by the study data and by the resource sponsor, should occur prior to recall. If, however, IRR members will replace current active duty personnel in less demanding assignments, then time would be available for receiving units or some especially chartered intermediate activity to provide needed training. A large part of this training could be done on the job or in on-the-job type conditions where IRR returnees could demonstrate their ability to perform job tasks under close, corrective supervision. It is our belief, based on available data that desired proficiency would be achieved relatively quickly on many tasks. Further, while decisions must still be made concerning formal training, either institutional or via OJT, our belief is that this type of training can be limited to the IRRs who have not continued in their specialty after EAOS.

Finally, based on (1) the IRR members' reports of their current relatively high residual levels of proficiency and (2) literature findings that maximum skill loss occurs after about 1 year of nonuse of skills, it appears that skill maintenance training for all FTMs is not strictly necessary. However, we would recommend periodic maintenance training for FTM IRRs who, as civilians, receive no practice on Navy-related job skills. Again, however, this conclusion must be weighed against planned utilization of recalled IRR members. For example, a casualty replacement scenario would make maintenance training for all more desirable than other scenarios.

CONCLUSIONS

1. Mobilization planners should be aware that the size of the FTM IRR manpower pool may be smaller than believed. Approximately 7 to 8 percent of the pool may not be contactable by mail. An additional segment of unknown size may have already reenlisted and/or not be useful to the Navy for other reasons. A substantial percentage of FTMs listed in IRR files could also be beyond the zone of involuntary recall.

2. FTM IRR personnel who work in civilian occupations related to their FTM rating report less deterioration of skills than FTMs who are not similarly employed.

3. For FTM IRRs working in rating-related jobs, mean values of current proficiency reported compare favorably with those reported by active duty personnel. This finding suggests minimal needs for retraining of this subgroup. Of the 23 FTM job tasks for which skill deterioration was assessed, indications are that, for IRRs working in civilian jobs related to the rating, none will require concentrated training for returning skills to an acceptable level of proficiency prior to mobilization recall.

4. Retraining for FTMs who do not work in civilian occupations related to their FTM rating may be necessary prior to mobilization. Formal training consisting of refresher courses and supervised practice may be necessary. This conclusion is subject to concurrence by subject matter expert FTMs. Periodic maintenance training for the same FTMs may also be desirable.

5. FTM personnel off active duty for greater than 3 years will probably require training on SME-selected tasks to update skills.

RECOMMENDATIONS

1. Review, update, and validate the IRR data base content to assure that in the future accurate assessments of the size of the IRR manpower pool are available at all times. Take whatever other steps are necessary and available to assure continuous updating of the data base.

2. Amend existing procedures where possible to obtain information from IRR members concerning civilian employment. At the very least, obtain this information from those eligible for or receiving bonuses for continued IRR service. Consider these individuals as first choice for mobilization recall.

3. Request resource sponsors review the data of this study. Determine if agreement can be reached that the tasks generated by schoolhouse SMEs adequately represent the FTM-3 job. Determine that the FTM-3 job is, in fact, acceptable as the target performance level for returning FTM IRRs. Request resource sponsors consider the data of this study against factors such as changes to materials, procedures, equipment used by the rating, criticality of task performance, and mobilization plans for IRR personnel.

4. Task the Naval Education and Training Command to develop a specialized FTM premobilization curriculum.

5. Consider recalling a sample of FTM IRRs to assess their knowledge of current FTM-3 job requirements. Use this information to validate the data and conclusions of this study.

APPENDIX D

ANNEX 13

GAS TURBINE SYSTEM TECHNICIAN (ELECTRICAL) (GSE): SKILL DETERIORATION DURING NAVY INDIVIDUAL READY RESERVE (IRR) MEMBERSHIP

INTRODUCTION

Following a first-tour of active duty, Naval personnel who do not elect other reserve options are assigned to the Individual Ready Reserve (IRR) to complete a specified Military Service Obligation (MSO); other personnel may voluntarily enlist in the IRR. IRR members, typically in a nonpay, nondrill status, are subject to recall to active duty if mobilization of the Armed Forces is ordered. A major concern of mobilization planners is that the skills acquired on active duty may deteriorate over time under the IRR condition of nonuse. This raises the question of the contribution that can be made by recalled IRR service members. To determine the extent and nature of skill deterioration during IRR membership, the Naval Training Systems Center (NAVTRASYSCEN), Code 10, conducted an assessment study. The study was performed at the request of the Chief of Naval Operations (OP-01R1).

This study assessed skill deterioration for 16 critical Navy ratings identified by OP-01. The designation "critical" was based on the criterion of projected personnel shortfalls for mobilization. The Gas Turbine System Technician (Electrical) (GSE) rating was one of these 16.

PURPOSE OF THE STUDY

The purpose of the study was to assess skill deterioration during IRR membership and determine needs for training IRR personnel to restore, upgrade, or maintain their skills at minimum proficiency levels to support mobilization. Implicit in the tasking was the additional requirement to define minimum acceptable proficiency.

In a general sense, acceptable proficiency refers to the ability of a recalled ready reservist to make an effective contribution to a receiving unit's mission. In a more specific sense, it refers to ability to perform a defined set of job tasks at a defined level of competency. Performance proficiency information was essential to establish a baseline around which obtained skill deterioration information could be assessed and to define the terminal performance goals that any proposed training regimen should attempt to achieve.

APPROACH

Complete details of the technical approach to the study are presented in the main body of this report. A brief description is presented here.

Mail-out questionnaires were used to obtain information. Three senior enlisted GSEs, assigned to the Service School Command, Great Lakes, IL, served as subject matter experts (SME) for questionnaire development. Under guidance given by the project staff, the SMEs selected from various source materials a set of job tasks that, in their judgment, best represented the job (non-NEC specific) of an active duty GSE-3. This level was chosen in the belief that a recalled ready reservist who could perform GSE job tasks competently at the E-4 level would make a positive work contribution to a receiving unit.

The GSE-3 job task statements were used on questionnaires mailed to IRR and active duty personnel. Information sought concerned tasks performed and the level of competency attached to the performance of each. Level of competency was defined in terms of the amount of supervision needed to perform specific job tasks.

Questionnaires mailed to IRR personnel requested information about proficiency on each job task at the End of Active Obligated Service (EAOS) and at the present time (NOW). The difference between proficiency at EAOS and current proficiency would reflect skill deterioration during IRR membership.

Questionnaires mailed to active duty GSE-3s requested information about current proficiency on job tasks and proficiency expected after 2 years of nonperformance of the job tasks. The current proficiency estimates were needed to define criterion job performance for an active duty GSE-3. The data reflecting what is currently done on the job would define an acceptable level of performance. These data could be used as a baseline for judging amount and consequences of IRR skill deterioration. Copies of the data collection instruments are shown in the next section.

As of 25 September 1984, 16 GSEs were listed in Naval Military Personnel Command (NAVMILPERSCOM) computer files as assigned to the IRR. Names and addresses were obtained from NAVMILPERSCOM through the Naval Reserve Personnel Center (NAVRESPERSCEN). Questionnaires were mailed on 31 December 1984 under CNO (OP-11) cover letter to all 16 IRR GSEs. A follow-up mailing (11) was made on 29 January 1985. Questionnaire returns were accepted until 28 February 1985. Despite the small number, the IRR GSEs were included in the study at the specific request of OP-01R1. Their inclusion permitted development of a data collection instrument that would be available for future use. It also permitted the collection of baseline information describing the active duty GSE-3 job.

Coordination with Commander in Chief, U.S. Atlantic Fleet (CINCLANTFLT), Commander in Chief, U.S. Pacific Fleet (CINCPACFLT), and within CNO (OP-01) was accomplished for authorization to survey active duty GSE-3 personnel. A GSE-3 roster, current as of 2 August 1985, was obtained from NAVMILPERSCOM. From a pool of 338, a sample of 222 GSE-3s was determined using accepted survey research methods. Questionnaires were mailed on 18 September 1985 under CNO (OP-11) cover letter to unit/activity commanding officers for distribution to GSE-3s named. Returns were accepted until 31 December 1985. Returned questionnaires were scanned to determine data usability, and data were entered into computer files. Subsequently, summaries of the information of interest to the study were prepared.

RESULTS

Results pertinent to the assessment of GSE skill deterioration are presented in this section. All results presented concerning IRR GSEs must be considered as "information only" because of the very low sample size available.

QUESTIONNAIRE RETURN STATISTICS

Table D-13-1 shows, for both the IRR and active duty GSEs, the number of questionnaires mailed and number and percent of usable returns. For the IRR sample, the number/percent of nonvalid returns (nonvalid principally because of data base errors) is also shown. Percent usable returns was derived by dividing the number returned (10) by the number delivered (i.e., 16 - 1 = 15).

Table D-13-1

Questionnaire Return Statistics

Sample	No. Mailed	Usable Returns No.	Usable Returns %	Nonvalid No.	Nonvalid %
IRR	16	10	62	1	6
Active Duty	222	145	63		

QUESTIONNAIRE DATA SUMMARIES

Summaries of data obtained from the questionnaires are presented in table D-13-2 for IRR personnel and in table D-13-3 for active duty personnel. The tables are modified questionnaire forms.

Background Questions

Of 10 IRR GSEs answering the question, 3 (30 percent) reported that they now work in a civilian occupation related to their Navy GSE rating. Answers to the remaining two background questions for IRRs are not reported since it was determined that the answers might be redundant and could not be unambiguously interpreted. Of the active duty respondents answering the background questions (see table D-13-3), 128 of 141 (91 percent) work in rating. One hundred and thirty two (94 percent) are assigned shore duty.

Task Performance Data

The data summary tables (D-13-2 and D-13-3) show the number (F) and percent (%) of respondents reporting that they had never performed particular job tasks (i.e., they responded to the task description with a "1.") For IRRs, these data refer to the "at EAOS" answers and for active duty to the current (NOW) level of ability. A rank-order correlation (see Siegel, 1956) computed between the two sets of data ($\underline{r} = .154$, $p > .05$) indicated no significant agreement between the two classes of respondents.

Table D-13-2

Overall Summary of GSE IRR Questionnaire Data

PART 1:

1. If necessary, correct your Service Number.
2. Is the work which you do NOW related to your Navy rating?
   Yes _3_ No _7_
3. Have you done PREVIOUS work which is related to your Navy rating since your Expiration of Active Obligated Service (EAOS)?
   Yes _-_ No _-_
4. Have you received training related to your Navy rating since your Expiration of Active Obligated Service (EAOS)?
   Yes _-_ No _-_

ANSWER KEY:

(1) Have never performed the task.

(2) Can/could do simple parts of the task (need direct supervision).

(3) Can/could do most parts of the task (need general supervision).

(4) Can/could do all parts of the task (need only occasional supervision. Meets minimum local speed and accuracy standards.)

(5) Can/could do complete task quickly and accurately (need no supervision).

PART 2:

For each job task statement below:

A. Indicate your CURRENT level of ability according to the answer key above.

B. Estimate your PREVIOUS level of ability at the time of your EAOS according to the answer key above.

"(1)" Choices				A			B		
F	%		Tasks	N	Mean	SD	N	Mean	SD
-	-	1.	Inspect equipment components.	10	4.10	.994	10	4.50	.972
-	-	2.	Perform preventive maintenance on control and monitoring circuits.	10	4.10	.568	10	4.70	.483
-	-	3.	Maintain electrical cabling, wiring, and connectors by locating shorts and grounds.	10	4.40	.966	10	4.60	.966
-	-	4.	Measure current, voltage, phase angle impedence, and resistance in circuits.	10	4.40	.966	10	4.50	.707
-	-	5.	Operate automatic/manual bus transfer switches.	10	4.90	.316	10	4.90	.316
-	-	6.	Determine battery condition, log hydrometer readings, activate and place battery in service as required.	10	4.70	.483	10	4.80	.422

Table D-13-2 (Continued)

-	-	7. Inspect and measure insulation resistance of motors and generators.	10	4.40	1.075	10	4.60	.843
1	10.0	8. Perform preventive maintenance on digital data equipment.	10	3.70	1.418	10	4.10	1.197
-	-	9. Use schematic diagrams, drawings, charts, and blueprints.	10	3.60	1.075	10	4.20	.919
-	-	10. Perform pre-operational checks, align support systems, and operate gas turbine IAW EOSS.	10	3.50	1.080	10	4.40	.966
-	-	11. Recognize fault indications from dials, gages, and controls at central control station, locate control stations, and ship's control console.	10	3.60	.966	10	4.80	.422
-	-	12. Carry out casualty control procedures at local and central stations.	10	3.60	1.174	10	4.50	.707
1	10.0	13. Maintain logs.	10	4.00	1.333	10	4.20	1.229
2	20.0	14. Detect corrosion and assist in arresting by using preservation materials.	10	3.80	1.619	10	4.00	1.633
-	-	15. Operate, engineering control systems from the local operating station and CCS.	10	3.50	.707	10	4.60	.699
1	10.0	16. Operate electrical generator from switchboard.	10	3.50	1.179	10	4.40	1.265
1	10.0	17. Perform safety wiring of gas turbine electrical connectors and mechanical fittings.	10	4.20	1.229	10	4.50	1.269
1	10.0	18. Use test equipment for trouble-shooting electrical equipment.	10	4.10	1.287	10	4.40	.966
1	10.0	19. Repair and replace sensors.	10	4.10	1.287	10	4.20	1.317
1	10.0	20. Maintain power supplies for gas turbine electrical systems.	10	4.10	1.370	10	4.30	1.337
1	10.0	21. Rig and unrig shore power.	10	3.40	1.265	10	3.80	1.398
		Overall Mean:		3.99				

Table D-13-3

Overall Summary of GSE Active Duty Questionnaire Data

PART 1:

1. If necessary, correct your Service Number.
2. Does your current billet require you to work in your Navy rating?
   Yes 128 No 13
3. What type duty is your current billet?
   Sea 8 Shore 135

ANSWER KEY:

(1) Have never performed the task.

(2) Can/could do simple parts of the task (need direct supervision).

(3) Can/could do most parts of the task (need general supervision).

(4) Can/could do all parts of the task (need only occasional supervision. Meets minimum local speed and accuracy standards.)

(5) Can/could do complete task quickly and accurately (need no supervision).

PART 2:

For each job task statement below:

A. Use the answer key above to indicate your CURRENT level of ability.

B. Use the answer key above to estimate your EXPECTED level of ability after 2 years of not performing these tasks.

"(1)" Choices				A			B		
F	%		Tasks	N	Mean	SD	N	Mean	SD
5	3.4	1.	Inspect equipment components.	145	3.98	1.003	140	3.67	1.062
11	7.6	2.	Perform preventive maintenance on control and monitoring circuits.	145	3.59	1.222	139	3.30	1.100
10	6.9	3.	Maintain electrical cabling, wiring, and connectors by locating shorts and grounds.	145	3.67	1.161	140	3.47	1.166
8	5.6	4.	Measure current, voltage, phase angle impedence, and resistance in circuits.	144	3.80	1.215	140	3.62	1.208
22	15.3	5.	Operate automatic/manual bus transfer switches.	144	3.74	1.476	139	3.68	1.286
20	13.8	6.	Determine battery condition, log hydrometer readings, activate and place battery in service as required.	145	3.99	1.474	140	3.56	1.384

Table D-13-3 (Continued)

23	16.0	7. Inspect and measure insulation resistance of motors and generators.	144	3.68	1.471	140	3.56	1.405
32	22.2	8. Perform preventive maintenance on digital data equipment.	144	2.96	1.409	138	2.83	1.299
6	4.2	9. Use schematic diagrams, drawings, charts, and blueprints.	144	3.73	1.196	140	3.56	1.242
8	5.6	10. Perform pre-operational checks, align support systems, and operate gas turbine IAW EOSS.	142	3.76	1.173	141	3.32	1.155
7	4.8	11. Recognize fault indications from dials, gages, and controls at central control station, locate control stations, and ship's control console.	145	3.83	1.133	140	3.35	1.150
23	15.9	12. Carry out casualty control procedures at local and central stations.	145	3.29	1.348	140	2.85	1.086
5	3.5	13. Maintain logs.	144	4.35	.985	141	3.95	1.091
10	6.9	14. Detect corrosion and assist in arresting by using preservation materials.	144	4.25	1.168	141	4.12	1.137
22	15.2	15. Operate, engineering control systems from the local operating station and CCS.	145	3.39	1.385	136	3.11	1.184
26	17.9	16. Operate electrical generator from switchboard.	142	3.44	1.504	137	3.19	1.303
6	4.1	17. Perform safety wiring of gas turbine electrical connectors and mechanical fittings.	145	4.37	1.060	141	4.11	1.151
8	5.6	18. Use test equipment for trouble-shooting electrical equipment.	144	3.75	1.215	138	3.48	1.228
16	11.0	19. Repair and replace sensors.	145	3.89	1.334	140	3.70	1.251
23	15.9	20. Maintain power supplies for gas turbine electrical systems.	145	3.39	1.361	140	3.17	1.297
30	26.2	21. Rig and unrig shore power.	145	3.29	1.616	139	3.17	1.579

Tables D-13-2 and D-13-3 also show, for each task listed on a questionnaire, mean values for performance proficiency/competency, the standard deviation (SD) around the mean, and the number of cases (n) on which a mean is based. For the IRR sample, table D-13-2, the "A" column reflects current average ability level; the "B" column, EAOS average ability level. For the active duty sample (table D-13-3), the "A" column refers to current (NOW) ability and the "B" to proficiency expected after 2 years of nonperformance of a task.[1] A Pearson Product Moment Correlation ($r = .121$, $p > .05$) computed between task means for IRR EAOS and active duty NOW (current proficiency) values indicates that the IRR members while on active duty did not perform job tasks at competency levels equivalent to those of current job incumbents.

For the IRR group, an overall grand mean for current proficiency was computed over all tasks for the rating. This single number indicates that considering the GSE-3 job in its entirety (as reflected by the tasks used) the average IRR member feels that he could now perform tasks of the rating at a level where only occasional supervision would be needed (mean = 4.0). Note again, however, that this mean is based on only 10 IRR GSEs. Consequently, little credence can be given.

For the active duty group, means reflecting proficiency on each job task for GSEs working/not working in their rating were computed. These are shown in table D-13-4. Again, the expected-after-2-years data are provided for information only.

SKILL DETERIORATION

Table D-13-5 displays task proficiency means for two subgroups of the GSE IRR respondents: (1) those who answered that they were now working ("W") in a field related to the Navy GSE rating and (2) those who indicated that they were not working ("N") in a related field. Both EAOS and NOW (current) proficiency means are given. These means, as well as those in table D-13-4, were computed from choices of 2, 3, 4, or 5 from the answer key. These choices place proficiency along a continuum from "Need direct supervision" through "Need no supervision."

As mentioned earlier, skill deterioration is reflected by differences between EAOS proficiency and NOW proficiency. In table D-13-5, values preceded by a minus sign represent a decrease in proficiency during IRR membership: current proficiency is less than EAOS proficiency. Values with no signs indicate increases in proficiency. The data are presented for information only.

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[1] These expected-after-2-years proficiency values were not used in subsequent analyses, however, since it was clear that many respondents did not understand the question being asked.

Table D-13-4

Task Mean Values for Two Subgroups of Active Duty GSEs

	Not Working ("N")[1]		Working ("W")[2]	
Task	NOW	EXP	NOW	EXP
1	3.444	3.818	4.134	3.715
2	3.167	3.750	3.856	3.445
3	4.000	4.111	3.872	3.512
4	3.625	3.800	3.992	3.752
5	3.500	3.727	4.282	3.921
6	4.000	4.273	4.491	4.159
7	4.167	4.625	4.216	3.823
8	3.000	3.750	3.552	3.131
9	3.909	4.167	3.863	3.617
10	3.455	3.583	3.958	3.397
11	3.727	3.583	4.000	3.417
12	3.444	3.500	3.780	3.018
13	4.077	4.167	4.512	4.008
14	4.583	4.636	4.479	4.215
15	3.400	3.545	3.847	3.277
16	3.000	3.455	4.086	3.500
17	4.100	4.000	4.548	4.281
18	4.333	4.111	3.929	3.537
19	4.000	4.250	4.264	3.882
20	4.250	4.286	3.852	3.412
21	3.375	4.111	4.168	3.779

Composite Mean:	Group W	NOW	4.080
		EXP	3.657
	Group N	NOW	3.741
		EXP	3.964
Overall Mean:		NOW	3.910
		EXP	3.811

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[1] n = 13

[2] n = 128

Table D-13-5

Task Mean Values for Two Subgroups of IRR GSEs

	Not Working ("N")[1]		Working ("W")[2]		Mean Difference	
Task	NOW	EAOS	NOW	EAOS	"N"	"W"
1	4.000	4.333	4.000	4.667	-0.333	-0.667
2	4.167	4.500	3.667	5.000	-0.333	-1.333
3	4.167	4.333	4.667	5.000	-0.166	-0.333
4	4.667	4.500	3.667	4.333	0.167	-0.666
5	4.833	4.833	5.000	5.000	0.000	0.000
6	4.667	4.833	4.667	4.667	-0.166	0.000
7	4.667	4.667	3.667	4.333	0.000	-0.666
8	4.200	4.600	3.333	4.000	-0.400	-0.667
9	3.667	4.000	3.667	4.667	-0.333	-1.000
10	3.667	4.000	3.333	5.000	-0.333	-1.667
11	4.000	4.667	3.000	5.000	-0.667	-2.000
12	3.833	4.500	2.667	4.333	-0.667	-1.666
13	4.667	4.667	4.000	4.500	0.000	-0.500
14	4.600	4.600	5.000	5.000	0.000	0.000
15	3.667	4.333	3.333	5.000	-0.666	-1.667
16	4.000	4.800	3.333	4.667	-0.800	-1.334
17	4.500	4.833	4.500	5.000	-0.333	-0.500
18	3.833	4.167	4.333	4.667	-0.334	-0.334
19	4.167	4.333	5.000	5.000	-0.166	0.000
20	4.500	4.500	4.000	5.000	0.000	-1.000
21	3.833	3.833	3.500	4.500	0.000	-1.000

Composite Mean:	Group W	NOW	3.921
		EOS	4.730
	Group N	NOW	4.205
		EOS	4.468
Overall Mean:		NOW	4.063
		EOS	4.599

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[1] n = 7

[2] n = 3

TIME IN IRR

Table D-13-6 provides a breakdown of GSE personnel by time spent in the IRR prior to mail out of the questionnaires. The table also shows mean values, computed over all tasks of the rating, that were assigned for proficiency for each 6-month interval of IRR time. These mean values are shown for information only, since the number of individuals in each group is too small to permit meaningful quantitative interpretation.

Table D-13-6

Mean Proficiency Values for GSE IRR Respondents by Time Since EAOS

Time (Mos.) Since EAOS	Mean	No. of Cases
0-5	2.86	1
6-11	4.26	3
12-17	4.67	1
18-23	3.27	2
24-35	4.39	2
36+	4.29	1
Overall Mean	3.99	10

COMMENTS AND OBSERVATIONS

Comments and observations on the data are offered here. Interpretations relating to IRR members are not warranted, however, because of the small number involved. Legitimate conclusions concerning skill deterioration and retraining needs cannot be made. Comments on the active duty data are provided, however.

TRAINING NEEDS

An important concern of this study was with determining the need for training GSE IRR personnel to acceptable proficiency levels prior to a mobilization recall. Although skill deterioration could not be assessed, data were obtained that define acceptable level of proficiency. The current proficiency levels reported by active duty personnel can be taken as E-4 (GSE-3) criterion performance; they reflect the level of proficiency claimed by the average GSE-3 now on active duty. These data may be used to establish the goals for any type of training program and also for assessing skill loss if data, and opportunity, are subsequently provided.

For effective future use of the data, the meaning of specific numerical values reported for task means must be clearly understood to reach conclusions about skill deterioration or training. Attention is directed to the "answer key" shown on either table D-13-2 or D-13-3. The answer key shows that a value of "4," for example, represents skilled performance with only a need for occasional supervision. Following conventional practice, we assume that a "4" is reflected by any values between 3.50 and 4.49. A "3" is interpreted similarly. Thus, skill deterioration may be shown by lower mean values for NOW (i.e., current) versus EAOS proficiency. However, the change from EAOS scores may not be sufficient to move the IRR respondents to a lower proficiency category. For example, skill loss on task 2 occurred for the IRRs not working in a related field (see table D-13-5). However, the losses reported resulted in the IRRs remaining in the "4" category. We would conclude that the deterioration is of no consequence insofar as signaling a need for retraining.

Assessment of the need for training reserve personnel against mobilization would proceed with the application of similar logic. In this case, the task mean values for "current" proficiency (i.e., after skill deterioration has occurred) of IRR personnel would be compared to the values for active duty (working in rating) personnel. If the values, in each case, fall into the same proficiency categories, a fair conclusion would be that training of IRRs would probably not be required before mobilization to bring proficiency to an acceptable level.

An additional factor to consider in assessing needs for training, however, concerns time since EAOS. For IRRs who have been away from active duty for more than 3 years, skill upgrade training should be considered to respond to any technical changes (e.g., new equipment, materials, procedures) in the field.

CONCLUSIONS

1. Conclusions concerning skill deterioration and training needs of GSE IRRs cannot be provided because of the small number of individuals assigned to the IRR at the time of the study.

2. Data obtained from the active duty sample of GSE-3s can be used to establish training programs for GSEs. They can also be used in future efforts to assess implications of skill loss information that may subsequently become available.

RECOMMENDATIONS

1. Request resource sponsors review the data of this study. Determine if agreement can be reached that the tasks generated by schoolhouse SMEs adequately represent the GSE-3 job. Determine that the GSE-3 job is, in fact, acceptable as the target performance level for returning GSE IRRs.

2. Consider recalling a sample of GSE IRRs to assess their knowledge of current GSE-3 job requirements. Use the data of this study as a baseline for decisions about skill loss and retraining needs.

APPENDIX D

ANNEX 14

HOSPITAL CORPSMAN (HM): SKILL DETERIORATION DURING NAVY INDIVIDUAL READY RESERVE (IRR) MEMBERSHIP

INTRODUCTION

Following a first-tour of active duty, Naval personnel who do not elect other reserve options are assigned to the Individual Ready Reserve (IRR) to complete a specified Military Service Obligation (MSO); other personnel may voluntarily enlist in the IRR. IRR members, typically in a nonpay, nondrill status, are subject to recall to active duty if mobilization of the Armed Forces is ordered. A major concern of mobilization planners is that the skills acquired on active duty may deteriorate over time under the IRR condition of nonuse. This raises the question of the contribution that can be made by recalled IRR service members. To determine the extent and nature of skill deterioration during IRR membership, the Naval Training Systems Center (NAVTRASYSCEN), Code 10, conducted an assessment study. The study was performed at the request of the Chief of Naval Operations (OP-01R1).

This study assessed skill deterioration for 16 critical Navy ratings identified by OP-01. The designation "critical" was based on the criterion of projected personnel shortfalls for mobilization. The Hospital Corpsman (HM) rating was one of these 16.

PURPOSE OF THE STUDY

The purpose of the study was to assess skill deterioration during IRR membership and determine needs for training IRR personnel to restore, upgrade, or maintain their skills at minimum proficiency levels to support mobilization. Implicit in the tasking was the additional requirement to define minimum, or acceptable, proficiency.

In a general sense, acceptable proficiency refers to the ability of a recalled ready reservist to make an effective contribution to a receiving unit's mission. In a more specific sense, it refers to ability to perform a defined set of job tasks at a defined level of competency. Performance proficiency information was essential to establish a baseline around which obtained skill deterioration information could be assessed and to define the terminal performance goals that any proposed training regimen should attempt to achieve.

APPROACH

Complete details of the technical approach to the study are presented in the main body of this report. A brief description is presented here.

Mail-out questionnaires were used to obtain information. Five senior enlisted HMs, assigned to the Regional Medical Center, Orlando, FL, served as subject matter experts (SME) for questionnaire development. Under guidance given by the project staff, the HM SMEs selected from various source materials a set of job tasks that, in their judgment, best represented the job (non-NEC specific) of an active duty HM-3. This level was chosen in the belief that a recalled ready reservist who could perform HM job tasks competently at the E-4 level would make a positive work contribution to a receiving unit.

The HM-3 job task statements were used on questionnaires mailed to IRR and active duty personnel. Information sought concerned tasks performed and the level of competency attached to the performance of each. Level of competency was defined in terms of the amount of supervision needed to perform specific job tasks.

Questionnaires mailed to IRR personnel requested information about proficiency on each job task at the End of Active Obligated Service (EAOS) and at the present time (NOW). The difference between proficiency at EAOS and current proficiency would reflect skill deterioration during IRR membership.

Questionnaires mailed to active duty HM-3s requested information about current proficiency on job tasks and proficiency expected after 2 years of nonperformance of the job tasks. The current proficiency estimates were needed to define criterion job performance for an active duty HM-3. The data reflecting what is currently done on the job would define an acceptable level of performance. These data could be used as a baseline for judging amount and consequences of IRR skill deterioration. Copies of these data collection instruments are shown in the next section.

As of 25 September 1984, 1,935 HMs were listed in Naval Military Personnel Command (NAVMILPERSCOM) computer files as assigned to the IRR. Names and addresses were obtained from NAVMILPERSCOM through the Naval Reserve Personnel Center (NAVRESPERSCEN). Questionnaires were mailed under CNO (OP-11) cover letter on 22 October 1984 to a random sample of 500 (26 percent). Coordination with the Office of the Navy Surgeon General had previously been accomplished. Because of a low initial return rate, a follow-up mailing (320) was made on 29 January 1985. Questionnaire returns were accepted until 28 February 1985.

Coordination with Commander in Chief, U.S. Atlantic Fleet (CINCLANTFLT), Commander in Chief, U.S. Pacific Fleet (CINCPACFLT), and within CNO (OP-01) was accomplished for authorization to survey active duty HM-3 personnel. An HM-3 roster, current as of 2 August 1985, was obtained from NAVMILPERSCOM. From a pool of 6,022, a sample of 456 HM-3s was determined using accepted survey research methods. Questionnaires were mailed on 18 September 1985 under CNO (OP-11) cover letter to unit/activity commanding officers for distribution to HM-3s named. Returns were accepted until 31 December 1985. Returned questionnaires were scanned to determine data usability, and data were entered into computer files. Subsequently, summaries of the information of interest to the study were prepared.

RESULTS

Results pertinent to the assessment of HM skill deterioration are presented in this section.

QUESTIONNAIRE RETURN STATISTICS

Table D-14-1 shows, for both the IRR and active duty HMs, the number of questionnaires mailed and number and percent of usable returns. For the IRR sample, the number/percent of nonvalid returns (nonvalid principally because

of data base errors) is also shown. Percent usable returns was derived by dividing the number returned (214) by the number delivered (i.e., 500 - 54 = 446).

Table D-14-1

Questionnaire Return Statistics

Sample	No. Mailed	Usable Returns No.	Usable Returns %	Nonvalid No.	Nonvalid %
IRR	500	214	48	54	11
Active Duty	456	285	63		

QUESTIONNAIRE DATA SUMMARIES

Summaries of data obtained from the questionnaires are presented in table D-14-2 for IRR personnel and in table D-14-3 for active duty personnel. The tables are modified questionnaire forms.

Background Questions

Of 211 IRR HMs answering the question, 107 (approximately 51 percent) reported that they now work in a civilian occupation related to their Navy HM rating. Answers to the remaining two background questions for IRRs (see table D-14-2) are not reported since it was determined that the answers might be redundant and could not be unambiguously interpreted. Of the active duty respondents answering the background questions (see table D-14-3), 246 of 278 (88.5 percent) work in rating. One hundred and ninety-five (69 percent) are assigned sea duty.

Task Performance Data

The data summary tables (D-14-2 and D-14-3) show the number (F) and percent (%) of respondents reporting that they had never performed particular job tasks (i.e., they responded to the task description with a "1.") For IRRs, these data refer to the "at EAOS" answers and for active duty to the current (NOW) level of ability. A rank-order correlation (see Siegel, 1956) computed between the two sets of data ($\underline{r} = .924$, $p < .05$) indicated significant agreement between the two classes of respondents. Thus, tasks which have not been performed by active duty HMs (to date) are the same tasks that had not been performed by IRRs at EAOS.

Tables D-14-2 and D-14-3 also show, for each task listed on a questionnaire, mean values for performance proficiency/competency, the standard deviation (SD) around the mean, and the number of cases (n) on which a mean is based. For the IRR sample, table D-14-2, the "A" column reflects current

Table D-14-2

Overall Summary of HM IRR Questionnaire Data

Table D-14-2 Overall Summary of HM IRR Questionnaire Data

PART 1:

1. If necessary, correct your Service Number.
2. Is the work which you do NOW related to your Navy rating?
   Yes 107 No 104
3. Have you done PREVIOUS work which is related to your Navy rating since your Expiration of Active Obligated Service (EAOS)?
   Yes - No -
4. Have you received training related to your Navy rating since your Expiration of Active Obligated Service (EAOS)?
   Yes - No -

ANSWER KEY:

(1) Have never performed the task.

(2) Can/could do simple parts of the task (need direct supervision).

(3) Can/could do most parts of the task (need general supervision).

(4) Can/could do all parts of the task (need only occasional supervision. Meets minimum local speed and accuracy standards.)

(5) Can/could do complete task quickly and accurately (need no supervision).

PART 2:

For each job task statement below:

A. Indicate your CURRENT level of ability according to the answer key above.

B. Estimate your PREVIOUS level of ability at the time of your EAOS according to the answer key above.

"(1)" Choices				A			B		
F	%		Tasks	N	Mean	SD	N	Mean	SD
25	11.8	1.	Operate suction apparatus, administer oxygen, and handle gas bottles following general safety precautions.	212	3.77	1.410	212	4.02	1.384
3	1.4	2.	Demonstrate a basic understanding of anatomy and physiology including the function of body systems and special sense organs.	211	4.27	.974	211	4.34	.887
5	2.4	3.	Perform (actual or simulated) cardiopulmonary resuscitation (CPR).	212	4.72	.678	210	4.72	.790
9	4.2	4.	Transport patients with or without special equipment.	213	4.32	1.064	213	4.47	1.007

Table D-14-2 (Continued)

4	1.9	5. Provide emergency treatment for common injuries, asphyxia, hemorrhage, shock, wounds, burns, unconsciousness, heat stroke, exhaustion, frost bite, immersion foot, eye irritation, and hyperventilation.	213	4.18	1.053	213	4.41	.920
35	16.5	6. Perform catheterization and provide urinary catheter care.	212	3.52	1.528	212	3.78	1.509
14	6.6	7. Use basic pharmaceutical calculations to prepare and dispense commonly used pharmaceuticals.	213	3.46	1.361	213	3.82	1.255
12	5.6	8. Convert weights and measures to approximate equivalents between commonly used systems.	213	3.60	1.386	213	3.82	1.262
58	27.4	9. Examine food service workers.	212	3.11	1.673	212	3.47	1.679
20	9.4	10. Identify immunization types, methods and recording procedures.	212	3.73	1.515	212	4.14	1.402
8	3.8	11. Assemble intravenous therapy equipment and regulate flow.	213	3.86	1.306	213	4.31	1.176
24	11.3	12. Collect routine blood samples; perform complete blood count, urinalysis, and gram stain.	213	3.30	1.493	213	3.75	1.431
32	15.0	13. Prepare minor surgical packs; perform sterile and sterilization techniques.	213	3.41	1.630	213	3.81	1.487
20	9.4	14. Perform ward administration functions (e.g., routine reports transcribe medical officer's orders, write admission nursing notes).	213	3.57	1.486	213	4.09	1.286
34	16.0	15. Admit, transfer, and discharge patients.	213	3.36	1.549	213	3.85	1.496
33	15.5	16. Perform preventive maintenance on ward and clinical equipment.	213	3.22	1.515	213	3.68	1.451
6	2.8	17. Order and maintain supplies.	213	4.08	1.212	213	4.56	.897
-	-	18. Measure vital signs (e.g., temperature, respiration, blood pressure).	213	4.85	.631	213	4.98	.180
		Overall Mean:		3.80				

Table D-14-3

Overall Summary of HM Active Duty Questionnaire Data

PART 1:

1. If necessary, correct your Service Number.
2. Does your current billet require you to work in your Navy rating?
   Yes 246 No 32
3. What type duty is your current billet?
   Sea 195 Shore 87

ANSWER KEY:

(1) Have never performed the task.

(2) Can/could do simple parts of the task (need direct supervision).

(3) Can/could do most parts of the task (need general supervision).

(4) Can/could do all parts of the task (need only occasional supervision. Meets minimum local speed and accuracy standards.)

(5) Can/could do complete task quickly and accurately (need no supervision).

PART 2:

For each job task statement below:

A. Use the answer key above to indicate your CURRENT level of ability.

B. Use the answer key above to estimate your EXPECTED level of ability after 2 years of not performing these tasks.

"(1)" Choices					A			B	
F	%		Tasks	N	Mean	SD	N	Mean	SD
31	11.6	1.	Operate suction apparatus, administer oxygen, and handle gas bottles following general safety precautions.	284	3.91	1.390	264	3.26	1.326
4	1.4	2.	Demonstrate a basic understanding of anatomy and physiology including the function of body systems and special sense organs.	284	4.25	.918	264	3.70	1.060
4	1.4	3.	Perform (actual or simulated) cardiopulmonary resuscitation (CPR).	283	4.77	.630	262	4.34	.878
17	6.0	4.	Transport patients with or without special equipment.	284	4.30	1.124	263	3.85	1.165

Table D-14-3 (Continued)

18	6.3	5. Provide emergency treatment for common injuries, asphyxia, hemorrhage, shock, wounds, burns, unconsciousness, heat stroke, exhaustion, frost bite, immersion foot, eye irritation, and hyperventilation.	285	4.15	1.132	266	3.56	1.168
58	20.6	6. Perform catheterization and provide urinary catheter care.	281	3.52	1.549	263	3.06	1.440
44	15.5	7. Use basic pharmaceutical calculations to prepare and dispense commonly used pharmaceuticals.	284	3.37	1.368	266	2.76	1.269
29	10.2	8. Convert weights and measures to approximate equivalents between commonly used systems.	283	3.50	1.273	265	2.94	1.237
93	32.9	9. Examine food service workers.	283	3.23	1.723	260	2.96	1.598
38	13.5	10. Identify immunization types, methods and recording procedures.	282	3.65	1.427	263	3.00	1.299
20	7.0	11. Assemble intravenous therapy equipment and regulate flow.	285	4.11	1.239	264	3.51	1.270
42	14.7	12. Collect routine blood samples; perform complete blood count, urinalysis, and gram stain.	285	3.44	1.451	261	2.92	1.381
51	18.0	13. Prepare minor surgical packs; perform sterile and sterilization techniques.	283	3.56	1.529	263	3.10	1.382
57	20.2	14. Perform ward administration functions (e.g., routine reports transcribe medical officer's orders, write admission nursing notes).	282	3.48	1.506	259	2.93	1.320
83	29.3	15. Admit, transfer, and discharge patients.	282	3.65	1.586	259	2.71	1.362
65	23.1	16. Perform preventive maintenance on ward and clinical equipment.	281	3.21	1.530	259	2.83	1.353
31	11.0	17. Order and maintain supplies.	282	4.08	1.341	265	3.61	1.287
4	1.4	18. Measure vital signs (e.g., temperature, respiration, blood pressure).	285	4.88	.556	266	4.75	.715

average ability level; the "B" column, EAOS average ability level. For the active duty sample (table D-14-3), the "A" column refers to current (NOW) ability and the "B" to proficiency expected after 2 years of nonperformance of a task.[1] A Pearson Product Moment Correlation ($r = .930$, $p < .05$) computed between task means for IRR EAOS and active duty NOW (current proficiency) values indicated that the IRR members, while on active duty, performed job tasks at competency levels equivalent to those of current job incumbents.

For the IRR group, an overall grand mean for current proficiency was computed over all tasks for the rating. This single number indicates that considering the HM-3 job in its entirety (as reflected by the tasks used) the average IRR member feels that he could now perform tasks of the rating at a level where only occasional supervision would be needed (mean = 3.8).

For the active duty group, means reflecting proficiency on each job task for HMs working/not working in their rating were computed. These are shown in table D-14-4. Again, the expected-after-2-years data are provided for information only.

SKILL DETERIORATION

Table D-14-5 displays task proficiency means for two subgroups of the HM IRR respondents: (1) those who answered that they were now working ("W") in a field related to the Navy HM rating and (2) those who indicated that they were not working ("N") in a related field. Both EAOS and NOW (current) proficiency means are given. These means, as well as those in table D-14-4, were computed from choices of 2, 3, 4, or 5 from the answer key. These choices place proficiency along a continuum from "Need direct supervision" through "Need no supervision."

As mentioned earlier, skill deterioration is reflected by differences between EAOS proficiency and NOW proficiency. In table D-14-5, values preceded by a minus sign represent a decrease in proficiency during IRR membership: current proficiency is less than EAOS proficiency. Values with no signs indicate increases in proficiency.

The table shows that HMs who now work ("W") in a field related to their former active duty jobs gained proficiency on 4 of the 18 job tasks. Although the differences are not large, this "W" group also reported less skill deterioration over all other rating tasks than the "N" group. Statistical tests (t tests for independent means; see Guilford and Fruchter, 1973) indicated that over all tasks of the rating, the proficiency of the two subgroups was equivalent at EAOS ($t = .4509$, $p < .3275$). Task mean proficiency values, however, differed significantly ($t = 3.04$, $p < .0022$) for current (NOW) proficiency.

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[1] These expected-after-2-years proficiency values were not used in subsequent analyses, however, since it was clear that many respondents did not understand the question being asked.

Table D-14-4

Task Mean Values for Two Subgroups of Active Duty HMs

Task	Not Working ("N")[1]		Working ("W")[2]	
	NOW	EXP	NOW	EXP
1	4.217	3.500	4.312	3.711
2	3.968	3.484	4.350	3.780
3	4.844	4.406	4.821	4.365
4	4.333	3.741	4.541	4.009
5	4.407	3.571	4.369	3.683
6	4.091	3.435	4.189	3.540
7	3.409	2.826	3.850	3.195
8	3.500	2.731	3.822	3.255
9	4.348	3.917	4.213	3.804
10	4.043	3.208	4.070	3.387
11	4.071	3.464	4.391	3.780
12	3.429	3.154	3.933	3.335
13	3.913	3.280	4.167	3.553
14	3.840	3.192	4.077	3.394
15	3.550	3.043	3.938	3.275
16	3.875	3.192	3.862	3.357
17	4.423	3.857	4.464	3.850
18	4.806	4.700	4.963	4.849

Composite Mean: Group W NOW 4.241
EXP 3.673
Group N NOW 4.059
EXP 3.483

Overall Mean: NOW 4.150
EXP 3.578

---

[1] n = 32
[2] n = 246

Table D-14-5

Task Mean Values for Two Subgroups of IRR HMs

Task	Not Working ("N")[1] NOW	EAOS	Working ("W")[2] NOW	EAOS	Mean Difference "N"	"W"
1	3.843	4.389	4.479	4.454	-0.546	0.025
2	4.111	4.406	4.557	4.358	-0.295	0.199
3	4.637	4.808	4.860	4.810	-0.171	0.050
4	4.237	4.582	4.626	4.667	-0.345	-0.041
5	4.131	4.475	4.476	4.467	-0.344	0.009
6	3.912	4.341	4.226	4.309	-0.429	-0.083
7	3.511	3.905	4.010	4.117	-0.394	-0.107
8	3.641	3.938	4.070	4.029	-0.297	0.041
9	4.101	4.466	4.108	4.316	-0.365	-0.208
10	4.022	4.396	4.172	4.484	-0.374	-0.312
11	3.851	4.460	4.370	4.404	-0.609	-0.034
12	3.464	4.011	3.968	4.167	-0.547	-0.199
13	3.787	4.341	4.154	4.284	-0.554	-0.130
14	3.917	4.348	4.168	4.470	-0.431	-0.302
15	3.862	4.379	4.092	4.407	-0.517	-0.315
16	3.558	4.084	4.022	4.229	-0.526	-0.207
17	4.189	4.634	4.455	4.686	-0.445	-0.231
18	4.900	4.971	4.954	4.981	-0.071	-0.027

Composite Mean:	Group W	NOW	4.320
		EOS	4.424
	Group N	NOW	3.982
		EOS	4.385
Overall Mean:		NOW	4.151
		EOS	4.405

---

[1] n = 104

[2] n = 107

TIME IN IRR

Table D-14-6 provides a breakdown of HM personnel by time spent in the IRR prior to mail out of the questionnaires. The table also shows mean values assigned for proficiency for 6-month intervals of IRR time, and for those IRRs who have been off active duty more than 3 years. Trends in skill deterioration are not apparent.

Table D-14-6

Mean Proficiency Values for HM IRR Respondents by Time Since EAOS

Time (Mos.) Since EAOS	Mean	No. of Cases
0-5	3.70	45
6-11	3.48	16
12-17	3.73	32
18-23	3.69	14
24-35	3.76	28
36+	3.99	73
Overall Mean	3.80	208

COMMENTS AND OBSERVATIONS

Comments and observations on the data are offered here. As warranted, interpretations are made and discussed. These interpretations provide the basis for certain conclusions about skill deterioration and retraining needs. Our conclusions are based on best available data. However, they are subject to validation. The low questionnaire return rates coupled with the uncertain quality of the IRR data base (discussed below) require cautious inferences and limit generalizations. Nevertheless, the results do provide much useful information about the IRR that has not been available previously. They also suggest directions that should be taken with respect to the management and utilization of the IRR resource.

COMMENTS ON DATA BASE

Approximately 11 percent of questionnaires returned were classified as "nonvalid" (table D-14-1). They reflect probable errors in the IRR data base. The nonvalid category included, most prominently, questionnaires returned by the Postal Service as undeliverable (bad addresses). It also

included, but to a much smaller extent, questionnaires returned by respondents with comments such as: "No longer in IRR, returned to active duty, already received final discharge. Retiree recruited from another service, was never on active duty in the Navy." (All information concerning such cases was transmitted to the Naval Reserve Personnel Center on 26 September 1985.) Finally, a very few questionnaires were returned by individuals who refused to provide information and, some, by relatives marked, "Deceased." From the above data, it can be concluded that about 11 percent of the HM IRRs could not or would not be available for a mobilization call.

Questionnaires were presumably delivered by the Postal Service to a number of HMs (52 percent) from whom no information was received. It is likely that many did not respond for reasons such as those cited above--they felt the questionnaire was not applicable. A further group, of unknown size, then would also be unavailable for mobilization because they are not in the viable IRR manpower pool as is currently believed. These considerations prompt a recommendation for review and validation of the HM IRR roster.

Another data base issue that should be examined concerns the amount of time that IRR HM respondents have been away from active duty. This information is given in table D-14-6. 35 percent were in the IRR for more than 3 years. Two issues emerge: (1) the need for skill upgrading and (2) availability of IRR members. Upgrade training because of new equipment, procedures, or material may be required for this group despite their beliefs (table D-14-6) in their continuing ability to perform job tasks at a fairly high level.

A second consideration concerns the Military Service Obligation (MSO). Those who are liable for a 6- or 8-year MSO (depending on when they entered on active duty) may be involuntarily recalled. Those who are beyond the MSO may only be recalled under existing agreements. If these agreements do not exist, still fewer individuals may be actually recallable for mobilization. The size of the available IRR manpower pool may be overestimated. Again, the recommendation is made that this data base be reviewed and validated if this is not already occurring.

SKILL DETERIORATION

Information directly pertinent to the question of skill deterioration was presented in table D-14-5. In table D-14-5, differences between mean values at EAOS and NOW (current proficiency) are shown. Values preceded by a minus sign represent skill deterioration potentially attributable to time spent in the IRR.

Approximately 51 percent of HM IRRs reported that they now work in a civilian occupation related to the HM rating and the effects of this work experience on skill deterioration will be considered next. As table D-14-5 shows, HMs who now work in a field related to their Navy rating actually gained proficiency on four job tasks and also reported less skill deterioration for all other HM job tasks than the "N" subgroup. Taken over all tasks, differences between the current (NOW) proficiency means for the two subgroups were statistically significant. Also, they could not be attributed to initial differences between the groups at EAOS. Thus, civilian HM-related employment significantly affected skill deterioration. Those continuing to work in the HM field after EAOS report less deterioration. The tasks on which the greatest amount of skill deterioration occurred are easily identifiable from table D-14-5.

TRAINING NEEDS

While skill deterioration information is of interest in its own right, the more important concern of this study is with determining the need for training IRR personnel prior to a mobilization recall. Thus, the implications of skill deterioration data must be assessed against the criterion of acceptable level of proficiency. This can be done most directly by comparing the current proficiency levels reported by HM IRRs against the levels reported by active duty HM-3s. The task means for the active duty sample can be taken as E-4 criterion performance since they reflect the level of proficiency claimed by the average HM-3 now on active duty.

The meaning of specific numerical values reported for task means must be clearly understood before conclusions about skill deterioration or training needs can be addressed. Attention is directed to the "answer key" shown on either table D-14-2 or D-14-3. The answer key shows that a value of "4," for example, represents skilled performance with only a need for occasional supervision. Following conventional practice, we assume that a "4" is reflected by any values between 3.50 and 4.49. A "3" is interpreted similarly. Skill deterioration may be shown by lower mean values for NOW (i.e., current) versus EAOS proficiency. However, the change from EAOS scores may not be sufficient to move the IRR respondents to a lower proficiency category. For example, skill loss on tasks 10 to 15 occurred for the IRRs working in a related field. However, the losses reported resulted in the IRRs remaining in the "4" category (see table D-14-5). We would conclude that the deterioration is of no consequence insofar as signaling a need for retraining.

Assessment of the need for training IRR personnel to support mobilization should proceed with the application of similar logic. Table D-14-7 below presents the task mean values reported for current proficiency by IRR personnel who are not working in a field related to the HM rating and also for those who are working in a related field. These values are from table D-14-5. Task proficiency means for active duty personnel working in their rating (taken from table D-14-4) are also shown in table D-14-7. Inspection of the data shows that all values are essentially "4"s. Hence, from these data alone, a fair conclusion is that training of HM IRRs would not be required before mobilization to bring proficiency to an acceptable level.

From our assessment, there seems to be no need for extensive retraining or maintenance training of HMs prior to mobilization. The average IRR HM should be able to perform required job tasks at an appropriate level of competency with a modicum of refamiliarization at mobilization. For the most part, this could probably be given by close, corrective supervision while the returnee is performing job tasks. This conclusion pertains to all HMs but is probably especially relevant to the 51 percent of IRR HMs who continue to work in an HM-related occupation.

Table D-14-7

Task Mean Proficiency Values for IRR and Active Duty HMs

	IRR		Active Duty
Tasks	Not in Field	In Field	In Rating
1	3.8	4.5	4.3
2	4.1	4.6	4.4
3	4.6	4.9	4.8
4	4.2	4.6	4.5
5	4.1	4.5	4.4
6	3.9	4.2	4.2
7	3.5	4.0	3.9
8	3.6	4.1	3.8
9	4.1	4.1	4.2
10	4.0	4.2	4.1
11	3.9	4.4	4.4
12	3.5	4.0	3.9
13	3.8	4.2	4.2
14	3.9	4.2	4.1
15	3.9	4.1	4.0
16	3.6	4.0	3.9
17	4.2	4.5	4.5
18	4.9	5.0	5.0

An additional factor to consider in assessing needs for training, however, concerns time since EAOS. Thirty-five percent of the HM IRRs in the sample were away from active duty for more than 3 years (see table D-14-6). Subject matter experts who review the data provided here may determine that skill upgrade training is required because of technical changes (e.g., new equipment, materials, procedures) in the field.

VALIDATION OF DATA

Our analyses indicate that the need for training of HM IRRs against mobilization requirements is not great. It would appear that required proficiency (i.e., the level shown by current job incumbents) can for the most part be achieved by familiarization training under direct corrective supervision in quite short time periods for most job tasks. There are no indications that comprehensive retraining for all rating tasks, such as would be provided in a formal school setting (e.g., "A" School), is needed. At worst case, instructional modules for training prospective HM returnees on given individual tasks may be required. Information not readily available to the project staff is needed, however, for firm decisions about the need for training to bring prospective IRR returnees to an acceptable level of proficiency or to maintain their skills at a defined level. We recommend that the information provided by this report be evaluated/validated against a number of other considerations. Resource sponsors would be appropriate to validate training needs.

Data Review

As noted previously, the conclusions generated by the project staff are considered tentative and subject to verification. Generalizations from the data have also been limited because of the small numbers of questionnaires returned and because of suspected IRR data base inadequacies. It is believed, however, that much useful information can be gleaned from the descriptive summaries provided. Most of this information has not previously been available because of the many difficulties inherent in conducting skill deterioration research and restrictions on methods that can be used because of practical considerations. Maximum exploitation of the information that is now available is in order. A complete and accurate assessment of the meaning and action implications of the data should be made by individuals who are thoroughly knowledgeable of technical requirements of the HM rating. The NAVTRASYSCEN, if requested, could assist SMEs in this effort. Areas to be considered in the review/validation process are discussed next.

Review Areas

For our study, SMEs from the Navy Hospital, Orlando, identified the job tasks they thought would be appropriate for returning IRR HM members to perform. Other SMEs may not agree on the list. Resource sponsors should determine if these are indeed the job tasks that an IRR returnee (at mobilization) should be able to perform. Further, a companion decision is required concerning the acceptability of the reported level of competency. Since active duty personnel report that they, on the average, now perform at these levels, these data reflect E-4 performance. Resource sponsors should consider whether less proficiency would be acceptable. If so, attendant training requirements for IRRs with concomittant resource requirements would be lessened. On judging the need for training, task criticality, in terms of personnel or equipment safety as it interacts with recent changes to material, procedures, or equipment, must also be considered.

An additional decision factor concerns plans for utilization of IRR personnel at mobilization. If these individuals will serve as casualty replacements, then a fairly high level of proficiency at recall is desirable. Training, as determined by the study data and by the resource sponsor, should occur prior to recall. If, however, IRR members will replace current active duty personnel in less demanding assignments, then time would be available for receiving units or some especially chartered intermediate activity to provide needed training. Likely, the bulk of this training could be done either on the job or in on-the-job type conditions where IRR returnees could demonstrate their ability to perform job tasks under close, corrective supervision. It is our belief, based on available data that desired proficiency would be achieved relatively quickly on most tasks. Further, while decisions must still be made concerning formal training, either institutional or via OJT, our belief is that this type of training can be limited.

Finally, based on (1) the IRR members' reports of their current relatively high residual levels of proficiency and (2) literature findings that maximum skill loss occurs after about 1 year of nonuse of skills, it appears that skill maintenance training for HMs is not strictly necessary. Again, however, this conclusion must be weighed against planned utilization of recalled IRR members. For example, a casualty replacement scenario would make maintenance training more desirable than other scenarios.

CONCLUSIONS

1. Mobilization planners should be aware that the size of the HM IRR manpower pool may be smaller than believed. Approximately 10 to 11 percent of the pool may not be contactable by mail. An additional segment of unknown size may have already reenlisted and/or not be useful to the Navy for other reasons. A substantial percentage of HMs listed in IRR files could also be beyond the zone of involuntary recall.

2. HM IRR personnel who work in civilian occupations related to their HM rating reported less deterioration of skills than HMs who are not similarly employed.

3. Comprehensive retraining and maintenance training for all IRR HMs appear to be unnecessary to support mobilization. Familiarization training, at recall, consisting of supervised practice may suffice. This conclusion is subject to concurrence by subject matter expert HMs.

4. HM personnel off active duty for greater than 3 years may require training on selected tasks to update skills despite their reported continuing high proficiency levels.

5. Of the 18 HM job tasks for which skill deterioration was assessed, indications are that none will require any concerted training for returning skills to an acceptable level of proficiency prior to mobilization recall.

6. For all HM IRRs, mean values of current proficiency reported compare favorably with those reported by active duty personnel. This finding also suggests minimal needs for retraining.

RECOMMENDATIONS

1. Review, update, and validate the IRR data base content to assure that accurate assessments of the size of the IRR manpower pool are available at all times. Take whatever other steps are necessary and available to assure continuous updating of the data base.

2. Amend existing procedures where possible to obtain information from IRR members concerning civilian employment. At the very least, obtain this information from those eligible for or receiving bonuses for continued

IRR service. Consider these individuals as first choice for mobilization recall.

3. Request resource sponsors review the data of this study. Determine if agreement can be reached that the tasks generated by schoolhouse SMEs adequately represent the HM-3 job. Determine that the HM-3 job is, in fact, acceptable as the target performance level for training to support mobilization. Request resource sponsors consider the data of this study against factors such as changes to materials, procedures, equipment used by the rating, criticality of task performance, and mobilization plans for IRR personnel.

4. Consider recalling a sample of HM IRRs to assess their knowledge of current HM-3 job requirements. Use this information to validate the data and conclusions of this study.

APPENDIX D

ANNEX 15

OPERATIONS SPECIALIST (OS): SKILL DETERIORATION DURING NAVY INDIVIDUAL READY RESERVE (IRR) MEMBERSHIP

INTRODUCTION

Following a first-tour of active duty, Naval personnel who do not elect other reserve options are assigned to the Individual Ready Reserve (IRR) to complete a specified Military Service Obligation (MSO); others may voluntarily enlist in the IRR. IRR members, typically in a nonpay, nondrill status, are subject to recall to active duty if mobilization of the Armed Forces is ordered. A major concern of mobilization planners is that the skills acquired on active duty may deteriorate over time under the IRR condition of nonuse. This raises the question of the contribution that can be made by recalled IRR service members. To determine the extent and nature of skill deterioration during IRR membership, the Naval Training Systems Center (NAVTRASYSCEN), Code 10, conducted an assessment study. The study was performed at the request of the Chief of Naval Operations (OP-01R1).

This study assessed skill deterioration for 16 critical Navy ratings identified by OP-01. The designation "critical" was based on the criterion of projected personnel shortfalls for mobilization. The Operations Specialist (OS) rating was one of these 16.

PURPOSE OF THE STUDY

The purpose of the study was to assess skill deterioration during IRR membership and determine needs for training IRR personnel to restore, upgrade, or maintain their skills at minimum proficiency levels to support mobilization. Implicit in the tasking was the additional requirement to define minimum, or acceptable, proficiency.

In a general sense, acceptable proficiency refers to the ability of a recalled ready reservist to make an effective contribution to a receiving unit's mission. In a more specific sense, it refers to ability to perform a defined set of job tasks at a defined level of competency. Performance proficiency information was essential to establish a baseline around which obtained skill deterioration information could be assessed and to define the terminal performance goals that any proposed training regimen should attempt to achieve.

APPROACH

Complete details of the technical approach to the study are presented in the main body of this report. A brief description is presented here.

Mail-out questionnaires were used to obtain information. Seven senior enlisted OSs, assigned to the Fleet Combat Training Center, Atlantic, Norfolk, VA, served as subject matter experts (SME) for questionnaire development. Under guidance given by the project staff, the OS SMEs selected from various source materials a set of job tasks that, in their judgment, best represented the job (non-NEC specific) of an active duty OS-3. This level was chosen in the belief that a recalled ready reservist who could perform OS job tasks competently at the E-4 level would make a positive work contribution to a receiving unit.

The OS-3 job task statements were used on questionnaires mailed to IRR and active duty personnel. Information sought concerned tasks performed and the level of competency attached to the performance of each. Level of competency was defined in terms of the amount of supervision needed to perform specific job tasks.

Questionnaires mailed to IRR personnel requested information about proficiency on each job task at the End of Active Obligated Service (EAOS) and at the present time (NOW). The difference between proficiency at EAOS and current proficiency would reflect skill deterioration during IRR membership.

Questionnaires mailed to active duty OS-3s requested information about current proficiency on job tasks and proficiency expected after 2 years of nonperformance of the job tasks. The current proficiency estimates were needed to define criterion job performance for an active duty OS-3. The data reflecting what is currently done on the job would define an acceptable level of performance. These data could be used as a baseline for judging amount and consequences of IRR skill deterioration. Copies of the data collection instruments are shown in the next section.

As of 25 September 1984, 1,117 OSs were listed in Naval Military Personnel Command (NAVMILPERSCOM) computer files as assigned to the IRR. Names and addresses were obtained from NAVMILPERSCOM through the Naval Reserve Personnel Center (NAVRESPERSCEN). Questionnaires were mailed on 30 October 1984 under CNO (OP-11) cover letter to a random sample of 500 (45 percent). Because of a low initial return rate, a follow-up mailing (365) was made on 29 January 1985. Questionnaire returns were accepted until 28 February 1985.

Coordination with Commander in Chief, U.S. Atlantic Fleet (CINCLANTFLT), Commander in Chief, U.S. Pacific Fleet (CINCPACFLT), and within CNO (OP-01) was accomplished for authorization to survey active duty OS-3 personnel. An OS-3 roster, current as of 2 August 1985, was obtained from NAVMILPERSCOM. From a pool of 2,668, a sample of 427 OS-3s was determined using accepted survey research methods. Questionnaires were mailed on 18 September 1985 under CNO (OP-11) cover letter to unit/activity commanding officers for distribution to OS-3s named. Returns were accepted until 31 December 1985. Returned questionnaires were scanned to determine data usability, and data were entered into computer files. Subsequently, summaries of the information of interest to the study were prepared.

RESULTS

Results pertinent to the assessment of OS skill deterioration are presented in this section.

QUESTIONNAIRE RETURN STATISTICS

Table D-15-1 shows, for both the IRR and active duty OSs, the number of questionnaires mailed and number and percent of usable returns. For the IRR sample, the number/percent of nonvalid returns (nonvalid principally because of data base errors) is also shown. Percent usable returns was derived by dividing the number returned (185) by the number delivered (i.e., 500 - 31 = 469).

Table D-15-1

Questionnaire Return Statistics

Sample	No. Mailed	Usable Returns No.	Usable Returns %	Nonvalid No.	Nonvalid %
IRR	500	185	39	31	6
Active Duty	427	290	68		

QUESTIONNAIRE DATA SUMMARIES

Summaries of data obtained from the questionnaires are presented in table D-15-2 for IRR personnel and in table D-15-3 for active duty personnel. The tables are modified questionnaire forms.

Background Questions

Of 181 IRR OSs answering the question, 12 (approximately 7 percent) reported that they now work in a civilian occupation related to their Navy OS rating. Answers to the remaining two background questions for IRRs (see table D-15-2) are not reported since it was determined that the answers might be redundant and could not be unambiguously interpreted. Of the active duty respondents answering the background questions (see table D-15-3), 266 of 284 (94 percent) work in rating. Two hundred and seventy-two (95 percent) are assigned shore duty.

Task Performance Data

The data summary tables (D-15-2 and D-15-3) show the number (F) and percent (%) of respondents reporting that they had never performed particular job tasks (i.e., they responded to the task description with a "1.") For IRRs, these data refer to the "at EAOS" answers and for active duty to the current (NOW) level of ability. A rank-order correlation (see Siegel, 1956) computed between the two sets of data ($\underline{r}_s = .563$, $p < .05$) indicated significant agreement between the two classes of respondents. Thus, tasks which have not been performed by active duty OSs (to date) tend to be the same tasks that had not been performed by IRRs at EAOS.

Tables D-15-2 and D-15-3 also show, for each task listed on a questionnaire, mean values for performance proficiency/competency, the standard deviation (SD) around the mean, and the number of cases (n) on which a mean is based. For the IRR sample, table D-15-2, the "A" column reflects current average ability level; the "B" column, EAOS average ability level. For the

Table D-15-2

Overall Summary of OS IRR Questionnaire Data

Table D-15-2 Overall Summary of OS IRR Questionnaire Data

PART 1:

1. If necessary, correct your Service Number.
2. Is the work which you do NOW related to your Navy rating?
   Yes 12 No 169
3. Have you done PREVIOUS work which is related to your Navy rating since your Expiration of Active Obligated Service (EAOS)?
   Yes - No -
4. Have you received training related to your Navy rating since your Expiration of Active Obligated Service (EAOS)?
   Yes - No -

ANSWER KEY:

(1) Have never performed the task.

(2) Can/could do simple parts of the task (need direct supervision).

(3) Can/could do most parts of the task (need general supervision).

(4) Can/could do all parts of the task (need only occasional supervision. Meets minimum local speed and accuracy standards.)

(5) Can/could do complete task quickly and accurately (need no supervision).

PART 2:

For each job task statement below:

A. Indicate your CURRENT level of ability according to the answer key above.

B. Estimate your PREVIOUS level of ability at the time of your EAOS according to the answer key above.

"(1)" Choices				A			B		
F	%		Tasks	N	Mean	SD	N	Mean	SD
2	1.1	1.	Start, operate, and tune radars; perform operational tests and adjustments on CIC equipment.	183	3.57	1.136	182	4.52	.812
32	17.8	2.	Operate radar indicator/NTDS consoles.	181	3.51	1.526	180	3.99	1.561
6	3.3	3.	Operate IFF equipment; process radar and IFF information through display and dissemination.	181	3.66	1.262	181	4.36	1.026
2	1.1	4.	Distinguish radar contacts caused by surface and air targets from those caused by land, weather, and analogous propagation.	183	4.47	.882	184	4.82	.581
9	4.9	5.	Recognize and counter interference/jamming.	183	3.75	1.218	184	4.32	1.039
2	1.1	6.	Use and maintain publications, op orders, op plans, and logs.	183	4.08	1.094	184	4.55	.822

Table D-15-2 (Continued)

		7. Carry out interior and exterior communications during:						
5	2.7	a. Independent steaming.	181	4.19	1.076	183	4.62	.822
3	1.7	b. Task force steaming.	179	3.99	1.117	181	4.51	.847
10	5.6	c. Radar assisted piloting.	178	3.93	1.201	180	4.42	1.035
3	1.7	8. Comply with communications security requirements.	179	4.30	.994	181	4.72	.850
21	11.5	9. Interpret and disseminate Link 14 printout data.	180	3.15	1.271	182	3.76	1.356
9	4.9	10. Encrypt and decrypt on radiotelephone circuits.	183	4.08	1.288	184	4.55	1.060
6	3.3	11. Encode, decode and interpret tactical signals using the Tactical Signal Book.	182	4.07	1.246	183	4.56	.929
6	3.3	12. Recognize and report communication intrusion and jamming.	182	3.93	1.203	183	4.43	.980
5	2.7	13. Solve manuevering board problems for course, speed, closest point of approach, revised closest point of approach, true wind, desired wind, change of station, and avoiding course.	183	3.59	1.168	184	4.45	.979
4	2.2	14. Maintain ships track on a nautical chart.	183	4.28	1.107	184	4.72	.787
1	.5	15. Construct a cartesian coordinate grid plot (x-y).	182	3.78	1.342	183	4.34	1.082
3	1.6	16. Maintain status boards.	182	4.46	.967	183	4.83	.648
4	2.2	17. Plot formation and screen diagrams.	183	3.95	1.199	184	4.50	.923
2	1.1	18. Maintain geographic plot on DRT/MC2 and perform "man overboard" procedures.	182	3.90	1.149	184	4.58	.819
			Overall Mean:	3.97				

Tale D-15-3

Overall Summary of OS Active Duty Questionnaire Data

PART 1:

1. If necessary, correct your Service Number.
2. Does your current billet require you to work in your Navy rating?
   Yes 266 No 18
3. What type duty is your current billet?
   Sea 14 Shore 272

ANSWER KEY:

(1) Have never performed the task.

(2) Can/could do simple parts of the task (need direct supervision).

(3) Can/could do most parts of the task (need general supervision).

(4) Can/could do all parts of the task (need only occasional supervision. Meets minimum local speed and accuracy standards.)

(5) Can/could do complete task quickly and accurately (need no supervision).

PART 2:

For each job task statement below:

A. Use the answer key above to indicate your CURRENT level of ability.

B. Use the answer key above to estimate your EXPECTED level of ability after 2 years of not performing these tasks.

"(1)" Choices				A			B		
F	%		Tasks	N	Mean	SD	N	Mean	SD
10	3.5	1.	Start, operate, and tune radars; perform operational tests and adjustments on CIC equipment.	285	4.27	.978	276	3.29	1.035
48	16.6	2.	Operate radar indicator/NTDS consoles.	285	3.91	1.566	275	3.23	1.360
18	6.3	3.	Operate IFF equipment; process radar and IFF information through display and dissemination.	287	4.23	1.170	278	3.33	1.170
6	2.1	4.	Distinguish radar contacts caused by surface and air targets from those caused by land, weather, and analogous propagation.	288	4.73	.731	277	4.13	.972
13	4.6	5.	Recognize and counter interference/jamming.	285	4.01	1.060	277	3.23	1.150
4	1.4	6.	Use and maintain publications, op orders, op plans, and logs.	287	4.21	.897	278	3.39	1.075

Table D-15-3 (Continued)

		7. Carry out interior and exterior communications during:						
11	3.8	a. Independent steaming.	286	4.58	.906	280	3.79	1.101
15	5.3	b. Task force steaming.	281	4.36	1.040	274	3.54	1.145
17	6.0	c. Radar assisted piloting.	281	4.34	1.064	274	3.55	1.170
6	2.1	8. Comply with communications security requirements.	285	4.62	.795	277	3.75	1.087
54	18.8	9. Interpret and disseminate Link 14 printout data.	287	3.47	1.495	276	2.76	1.245
14	4.9	10. Encrypt and decrypt on radiotelephone circuits.	288	4.79	1.046	280	3.66	1.210
8	2.8	11. Encode, decode and interpret tactical signals using the Tactical Signal Book.	287	4.58	.865	280	3.76	1.058
12	4.2	12. Recognize and report communication intrusion and jamming.	286	4.18	1.052	275	3.36	1.107
4	1.4	13. Solve manuevering board problems for course, speed, closest point of approach, revised closest point of approach, true wind, desired wind, change of station, and avoiding course.	288	4.43	.857	279	3.18	1.050
8	2.8	14. Maintain ships track on a nautical chart.	288	4.71	.830	277	4.13	1.072
17	6.0	15. Construct a cartesian coordinate grid plot (x-y).	285	2.24	1.123	276	3.47	1.254
4	1.4	16. Maintain status boards.	288	4.82	.628	279	4.31	.939
11	3.8	17. Plot formation and screen diagrams.	288	4.49	.963	279	3.75	1.198
9	3.1	18. Maintain geographic plot on DRT/MC2 and perform "man overboard" procedures.	288	4.52	.944	278	3.56	1.128

active duty sample (table D-15-3), the "A" column refers to current (NOW) ability and the "B" to proficiency expected after 2 years of nonperformance of a task.[1] A Pearson Product Moment Correlation ($r = .627$, $p < .05$) computed between task means for IRR EAOS and active duty NOW (current proficiency) values indicated that the IRR members, while on active duty, performed job tasks at competency levels equivalent to those of current job incumbents.

For the IRR group, an overall grand mean for current proficiency was computed over all tasks for the rating. This single number indicates that considering the OS-3 job in its entirety (as reflected by the tasks used) the average IRR member feels that he could now perform tasks of the rating at a level where only occasional supervision would be needed (mean = 4.0).

For the active duty group, means reflecting proficiency on each job task for OSs working/not working in their rating were computed. These are shown in table D-15-4. Again, the expected-after-2-years data are provided for information only.

SKILL DETERIORATION

Table D-15-5 displays task proficiency means for two subgroups of the OS IRR respondents: (1) those who answered that they were now ("W") working in a field related to the Navy OS rating and (2) those who indicated that they were not working ("N") in a related field. Both EAOS and NOW (current) proficiency means are given. These means, as well as those in table D-15-4, were computed from choices of 2, 3, 4, or 5 from the answer key. These choices place proficiency along a continuum from "Need direct supervision" through "Need no supervision."

As mentioned earlier, skill deterioration is reflected by differences between EAOS proficiency and NOW proficiency. In table D-15-5, values preceded by a minus sign represent a decrease in proficiency during IRR membership: current proficiency is less than EAOS proficiency. Values with no signs would indicate increases in proficiency.

The table shows that all OSs, regardless of current civilian employment, lost proficiency on all job tasks. Although the differences are not large, the subgroup (n=12) who reported that they now worked in a field related to the OS rating lost less skill overall than the subgroup not currently working in an OS-related civilian job. Statistical tests (t tests for independent means; see Guilford and Fruchter, 1973) indicated that over all tasks of the rating, the proficiency of the two subgroups differed significantly at EAOS ($t = 4.32$, $p < .0005$), and task mean proficiency values also differed significantly ($t = 1.96$, $p < .0289$) on current (NOW) proficiency.

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[1] These expected-after-2-years proficiency values were not used in subsequent analyses, however, since it was clear that many respondents did not understand the question being asked.

Table D-15-4

Task Mean Values for Two Subgroups of Active Duty OSs

	Not Working ("N")[1]		Working ("W")[2]	
Task	NOW	EXP	NOW	EXP
1	3.429	3.154	4.447	3.375
2	3.417	3.000	4.564	3.696
3	3.385	2.750	4.514	3.518
4	4.188	3.857	4.851	4.213
5	3.615	3.417	4.193	3.344
6	3.813	3.467	4.298	3.460
7A	4.091	3.727	4.753	3.902
7B	4.100	3.700	4.578	3.679
7C	4.000	3.727	4.597	3.734
8	4.250	3.688	4.729	3.813
9	3.200	3.000	4.087	3.165
10	4.000	3.800	4.715	3.829
11	4.214	3.643	4.723	3.844
12	3.692	3.154	4.363	3.488
13	3.647	3.063	4.550	3.227
14	4.462	4.091	4.836	4.244
15	4.154	3.308	4.472	3.682
16	4.529	4.000	4.893	4.378
17	4.308	3.636	4.656	3.892
18	3.786	3.000	4.700	3.673

Composite Mean:	Group W	NOW	4.576
		EXP	3.708
	Group N	NOW	3.914
		EXP	3.459
Overall Mean:		NOW	4.245
		EXP	3.583

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[1] n = 18

[2] n = 266

Table D-15-5

Task Mean Values for Two Subgroups of IRR OSs

	Not Working ("N")[1]		Working ("W")[2]		Mean Difference	
Task	NOW	EAOS	NOW	EAOS	"N"	"W"
1	3.654	4.548	4.182	4.583	-0.894	-0.401
2	4.119	4.635	3.900	4.600	-0.516	-0.700
3	3.806	4.441	4.167	4.833	-0.635	-0.666
4	4.494	4.845	4.917	5.000	-0.351	-0.083
5	3.936	4.460	4.167	4.750	-0.524	-0.583
6	4.072	4.554	4.583	5.000	-0.482	-0.417
7A	4.319	4.720	4.250	4.750	-0.401	-0.500
7B	4.082	4.555	4.083	4.750	-0.473	-0.667
7C	4.132	4.603	4.167	4.833	-0.471	-0.666
8	4.360	4.774	4.500	4.917	-0.414	-0.417
9	3.435	4.107	3.636	4.364	-0.672	-0.728
10	4.306	4.716	4.455	4.909	-0.410	-0.454
11	4.234	4.650	4.333	5.000	-0.416	-0.667
12	4.012	4.521	4.083	4.833	-0.509	-0.750
13	3.689	4.521	3.833	4.750	-0.832	-0.917
14	4.370	4.783	4.917	5.000	-0.413	-0.083
15	3.881	4.429	4.583	4.917	-0.548	-0.334
16	4.540	4.880	4.667	5.000	-0.340	-0.333
17	4.075	4.548	4.000	4.833	-0.473	-0.833
18	3.969	4.595	4.000	4.917	-0.626	-0.917

Composite Mean:	Group W	NOW	4.271
		EOS	4.827
	Group N	NOW	4.074
		EOS	4.594
Overall Mean:		NOW	4.173
		EOS	4.711

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[1] n = 169

[2] n = 12

TIME IN IRR

Table D-15-6 provides a breakdown of OS personnel by time spent in the IRR prior to mail out of the questionnaires. The table also shows mean values assigned for proficiency for 6-month intervals of IRR time, and for those IRRs who have been off active duty more than 3 years. Trends in skill deterioration are not apparent.

Table D-15-6

Mean Proficiency Values for OS IRR Respondents by Time Since EAOS

Time (Mos.) Since EAOS	Mean	No. of Cases
0-5	4.16	32
6-11	4.00	20
12-17	4.06	45
18-23	4.28	16
24-35	3.95	12
36+	3.62	44
Overall Mean	3.97	169

COMMENTS AND OBSERVATIONS

Comments and observations on the data are offered here. As warranted, interpretations are made and discussed. These interpretations provide the basis for certain conclusions about skill deterioration and retraining needs. Our conclusions are based on best available data. However, they are subject to validation. The low questionnaire return rates coupled with the uncertain quality of the IRR data base (discussed below) require cautious inferences and limit generalizations. Nevertheless, the results do provide much useful information about the IRR that has not been available previously. They also suggest directions that should be taken with respect to the management and utilization of the IRR resource.

COMMENTS ON DATA BASE

Approximately 6 percent of questionnaires returned were classified as "nonvalid" (table D-15-1). They reflect probable errors in the IRR data base. The nonvalid category included, most prominently, questionnaires returned by the Postal Service as undeliverable (bad addresses). It also

included, but to a much smaller extent, questionnaires returned by respondents with comments such as: "No longer in IRR, returned to active duty, already received final discharge. Retiree recruited from another service, was never on active duty in the Navy." (All information concerning such cases was transmitted to the Naval Reserve Personnel Center on 26 September 1985.) Finally, a very few questionnaires were returned by individuals who refused to provide information and, some, by relatives marked, "Deceased." From the above data, it can be concluded that only about 6 percent of the OS IRRs could not or would not be available for a mobilization call.

Questionnaires were presumably delivered by the Postal Service to a number of OSs (61 percent) from whom no information was received. It is likely that many did not respond for reasons such as those cited above--they felt the questionnaire was not applicable. A further group, of unknown size, then would also be unavailable for mobilization because they are not in the viable IRR manpower pool as is currently believed. These considerations prompt a recommendation for review and validation of the OS IRR roster.

Another data base issue that should be examined concerns the amount of time that IRR OS respondents have been away from active duty. This information is given in table D-15-6. Twenty-six percent were in the IRR for more than 3 years. Two issues emerge: (1) the need for skill upgrading and (2) availability of IRR members. Upgrade training because of new equipment, procedures, or material may be required for this group despite their beliefs (table D-15-6) in their continuing ability to perform job tasks at a fairly high level.

A second consideration concerns the military service obligation (MSO). Those who are liable for a 6- or 8-year MSO (depending on when they entered on active duty) may be involuntarily recalled. Those who are beyond the MSO may only be recalled under existing agreements. If these agreements do not exist, still fewer individuals may be actually recallable for mobilization. The size of the available IRR manpower pool may be overestimated. Again, the recommendation is made that this data base be reviewed and validated if this is not already occurring.

In the OS case, data base problems are far less apparent than for the other ratings studied. A 6 percent "bad address" rate, the lowest of all ratings assessed, is probably tolerable. Also, the finding that 74 percent of the rating has been away from active duty for less than 3 years suggests that OS skills will be at a higher level than those of other ratings. It also suggests that a proportionately higher number of OSs, compared to many other ratings will be available for recall.

SKILL DETERIORATION

Information directly pertinent to the question of skill deterioration was presented in table D-15-5. In table D-15-5, differences between mean values at EAOS and NOW (current proficiency) are shown. Values preceded by a minus sign represent skill deterioration potentially attributable to time spent in the IRR.

Approximately 7 percent of OS IRRs reported that they now work in a civilian occupation related to the OS rating and the effects of this work experience on skill deterioration will be considered next. As table D-15-5 shows, all OSs regardless of civilian employment lost skill on all job tasks. Those who now work in a field related to their Navy rating, however, reported less skill deterioration overall than the subgroup not working in a related field. Taken over all tasks, differences between the current (NOW) proficiency means for the two subgroups were statistically significant. Thus, it appears that civilian OS-related employment affects OS skill deterioration. Those continuing to work in the field after EAOS report less deterioration. However, since the two subgroups also differed at EAOS, this conclusion cannot be firmly stated since there are alternate explanations possible. The tasks on which the greatest amount of skill deterioration occurred are easily identifiable from table D-15-5.

TRAINING NEEDS

While skill deterioration information is of interest in its own right, the more important concern of this study is with determining the need for training IRR personnel prior to mobilization. Thus, the implications of skill deterioration data must be assessed against the criterion of acceptable level of proficiency. This can be done most directly by comparing the current proficiency levels reported by OS IRRs against the levels reported by active duty OS-3s. The task means for the active duty sample can be taken as E-4 criterion performance since they reflect the level of proficiency claimed by the average OS-3 now on active duty.

The meaning of specific numerical values reported for task means must be clearly understood before conclusions about skill deterioration or training needs can be addressed. Attention is directed to the "answer key" shown on either table D-15-2 or D-15-3. The answer key shows that a value of "4," for example, represents skilled performance with only a need for occasional supervision. Following conventional practice, we assume that a "4" is reflected by any values between 3.50 and 4.49. A "3" is interpreted similarly. Skill deterioration may be shown by lower mean values for NOW (i.e., current) versus EAOS proficiency. However, the change from EAOS scores may not be sufficient to move the IRR respondents to a lower proficiency category. Skill loss on task 3, for example, occurred for all OS IRRs, but the losses reported resulted in the IRRs remaining in the "4" category (see table D-15-5). We would conclude that the deterioration is of no consequence insofar as signaling a need for retraining.

Assessment of the need for training IRR personnel to support mobilization should proceed with the application of similar logic. Table D-15-7 below presents the task mean values reported for current proficiency by IRR personnel who are not working in a field related to the OS rating and also for those who are working in a related field. These values are from table D-15-5. Task proficiency means for active duty personnel working in their rating (taken from table D-15-4) are also shown in table D-15-7. Inspection of the data shows that all values except for task 9 are essentially "4"s.

Hence, from these data alone, a fair conclusion is that comprehensive training of OS IRRs would not be required before mobilization to bring proficiency to an acceptable level.

Table D-15-7

Task Mean Proficiency Values for IRR and Active Duty OSs

	IRR		Active Duty
Tasks	Not in Field	In Field	In Rating
1	3.7	4.2	4.4
2	4.1	3.9	4.6
3	3.8	4.2	4.5
4	4.5	4.9	4.9
5	3.9	4.2	4.2
6	4.1	4.6	4.3
7a	4.3	4.3	4.8
7b	4.1	4.1	4.6
7c	4.1	4.2	4.6
8	4.4	4.5	4.7
9	3.4*	3.6	4.1
10	4.3	4.5	4.7
11	4.2	4.3	4.7
12	4.0	4.1	4.4
13	3.7	3.8	4.6
14	4.4	4.9	4.8
15	3.9	4.6	4.5
16	4.5	4.7	4.9
17	4.1	4.0	4.7
18	4.0	4.0	7.7

*Probable training needs.

From our assessment, there seems to be no need for extensive retraining or maintenance training prior to mobilization. The average IRR OS should be able to perform required job tasks at an appropriate level of competency with a modicum of refamiliarization at mobilization. For the most part, this could probably be given by close, corrective supervision while the returnee is performing job tasks. This conclusion of minimal training needs pertains to all OSs but is probably especially relevant to those who continue to work in an OS-related occupation. Although the number of individuals in this subgroup was small, the finding mirrors that of other ratings.

An additional factor to consider in assessing needs for training concerns time since EAOS. Twenty-six percent of the OS IRRs in the sample were away from active duty for more than 3 years (see table D-15-6).

Subject matter experts who review the data provided here may determine that skill upgrade training is required because of technical changes (e.g., new equipment, materials, procedures) in the field.

VALIDATION OF DATA

Our analyses indicate that the need for training of OS IRRs against mobilization requirements is not great. It would appear that required proficiency (i.e., the level shown by current job incumbents) can for the most part be achieved by familiarization training under direct corrective supervision in quite short time periods for most job tasks. There are no indications that comprehensive retraining for all rating tasks, such as would be provided in a formal school setting (e.g., "A" School), is needed. At worst case, instructional modules for training prospective OS returnees on given individual tasks (e.g., task 9) may be required. Information not readily available to the project staff is needed, however, for firm decisions about the need for training to bring prospective IRR returnees to an acceptable level of proficiency or to maintain their skills at a defined level. We recommend that the information provided by this report be evaluated/validated against a number of other considerations. Resource sponsors would be appropriate to validate training needs.

Data Review

As noted previously, the conclusions generated by the project staff are considered tentative and subject to verification. Generalizations from the data have also been limited because of the small numbers of questionnaires returned and because of suspected IRR data base inadequacies. It is believed, however, that much useful information can be gleaned from the descriptive summaries provided. Most of this information has not previously been available because of the many difficulties inherent in conducting skill deterioration research and restrictions on methods that can be used because of practical considerations. Maximum exploitation of the information that is now available is in order. A complete and accurate assessment of the meaning and action implications of the data should be made by individuals who are thoroughly knowledgeable of technical requirements of the OS rating. The NAVTRASYSCEN, if requested, could assist SMEs in this effort. Areas to be considered in the review/validation process are discussed next.

Review Areas

For our study, SMEs from the Fleet Training Center, Norfolk, VA, identified the job tasks they thought would be appropriate for returning IRR OS members to perform. Other SMEs may not agree on the list. Resource sponsors should determine if these are indeed the job tasks that an IRR returnee (at mobilization) should be able to perform. Further, a companion decision is required concerning the acceptability of the reported level of competency. Since active duty personnel report that they, on the average, now perform at these levels, the data reflect E-4 criterion performance. Resource sponsors should consider whether less proficiency would be acceptable. If so, attendant training requirements for IRRs with concomitant resource requirements would be lessened. On judging the need for training, task criticality, in terms of personnel or equipment safety as it interacts with recent changes to material, procedures, or equipment, must also be considered.

An additional decision factor concerns plans for utilization of IRR personnel at mobilization. If these individuals will serve as casualty replacements, then a fairly high level of proficiency at recall is desirable. Training, as determined by the study data and by the resource sponsor, should occur prior to recall. If, however, IRR members will replace current active duty personnel in less demanding assignments, then time would be available for receiving units or some especially chartered intermediate activity to provide needed training. Likely, the bulk of this training could be done either on the job or in on-the-job type conditions where IRR returnees could demonstrate their ability to perform job tasks under close, corrective supervision. It is our belief, based on available data that desired proficiency would be achieved relatively quickly on most tasks. Further, while decisions must still be made concerning formal training, either institutional or via OJT, our belief is that this type of training can be limited.

Finally, based on (1) the IRR members' reports of their current relatively high residual levels of proficiency and (2) literature findings that maximum skill loss occurs after about 1 year of nonuse of skills, it appears that skill maintenance training for OSs is not strictly necessary. Again, however, this conclusion must be weighed against planned utilization of recalled IRR members. For example, a casualty replacement scenario would make maintenance training more desirable than other scenarios.

CONCLUSIONS

1. Mobilization planners should be aware that the size of the OS IRR manpower pool may be somewhat smaller than believed. Approximately 6 percent of the pool may not be contactable by mail. An additional segment of unknown size may have already reenlisted and/or not be useful to the Navy for other reasons. A substantial percentage of OSs listed in IRR files could also be beyond the zone of involuntary recall.

2. OS IRR personnel who work in civilian occupations related to their OS rating reported less deterioration of skills overall than those not similarly employed.

3. Comprehensive retraining and maintenance training for IRR OSs appear to be unnecessary to support mobilization. With the exception of one task, familiarization training, at recall, consisting of supervised practice may suffice. This conclusion is subject to concurrence by subject matter expert OSs.

4. OS personnel off active duty for greater than 3 years may require training on selected tasks to update skills despite their reported continuing high proficiency levels.

5. Of the 18 OS job tasks for which skill deterioration was assessed, indications are that only 1, dealing with Link 14, will require training emphasis prior to mobilization recall.

6. For all OS IRRs, mean values of current proficiency reported compare favorably with those reported by active duty personnel. This finding also suggests minimal needs for retraining.

RECOMMENDATIONS

1. Review, update, and validate the IRR data base content to assure that accurate assessments of the size of the IRR manpower pool are available at all times. Take whatever other steps are necessary and available to assure continuous updating of the data base.

2. Amend existing procedures where possible to obtain information from IRR members concerning civilian employment. At the very least, obtain this information from those eligible for or receiving bonuses for continued IRR service. Consider these individuals as first choice for mobilization recall.

3. Request resource sponsors review the data of this study. Determine if agreement can be reached that the tasks generated by schoolhouse SMEs adequately represent the OS-3 job. Determine that the OS-3 job is, in fact, acceptable as the target performance level for training to support mobilization. Request resource sponsors consider the data of this study against factors such as changes to materials, procedures, equipment used by the rating, criticality of task performance, and mobilization plans for IRR personnel.

4. Consider recalling a sample of OS IRRs to assess their knowledge of current OS-3 job requirements. Use this information to validate the data and conclusions of this study.

APPENDIX D

ANNEX 16

SONAR TECHNICIAN (SURFACE) (STG): SKILL DETERIORATION DURING NAVY INDIVIDUAL READY RESERVE (IRR) MEMBERSHIP

INTRODUCTION

Following a first-tour of active duty, Naval personnel who do not elect other reserve options are assigned to the Individual Ready Reserve (IRR) to complete a specified Military Service Obligation (MSO); other personnel may voluntarilyu enlist in the IRR. IRR members, typically in a nonpay, non-drill status, are subject to recall to active duty if mobilization of the Armed Forces is ordered. A major concern of mobilization planners is that the skills acquired on active duty may deteriorate over time under the IRR condition of nonuse. This raises the question of the contribution that can be made by recalled IRR service members. To determine the extent and nature of skill deterioration during IRR membership, the Naval Training Systems Center (NAVTRASYSCEN), Code 10, conducted an assessment study. The study was performed at the request of the Chief of Naval Operations (OP-01R1).

This study assessed skill deterioration for 16 critical Navy ratings identified by OP-01. The designation "critical" was based on the criterion of projected personnel shortfalls for mobilization. The Sonar Technician (Surface) (STG) rating was one of these 16.

PURPOSE OF THE STUDY

The purpose of the study was to assess skill deterioration during IRR membership and determine needs for training IRR personnel to restore, upgrade, or maintain their skills at minimum proficiency levels to support mobilization. Implicit in the tasking was the additional requirement to define minimum, or acceptable, proficiency.

In a general sense, acceptable proficiency refers to the ability of a recalled ready reservist to make an effective contribution to a receiving unit's mission. In a more specific sense, it refers to ability to perform a defined set of job tasks at a defined level of competency. Performance proficiency information was essential to establish a baseline around which obtained skill deterioration information could be assessed and to define the terminal performance goals that any proposed training regimen should attempt to achieve.

APPROACH

Complete details of the technical approach to the study are presented in the main body of this report. A brief description is presented here.

Mail-out questionnaires were used to obtain information. Six senior enlisted STGs, assigned to the Fleet Anti-Submarine Warfare Training Center, Pacific (San Diego, CA), served as subject matter experts (SME) for questionnaire development. Under guidance given by the project staff, the STG SMEs selected from various source materials a set of job tasks that, in their judgment, best represented the job (non-NEC specific) of an active duty STG-3. This level was chosen in the belief that a recalled ready reservist who could perform STG job tasks competently at the E-4 level would make a positive work contribution to a receiving unit.

The STG-3 job task statements were used on questionnaires mailed to IRR and active duty personnel. Information sought concerned tasks performed and the level of competency attached to the performance of each. Level of competency was defined in terms of the amount of supervision needed to perform specific job tasks.

Questionnaires mailed to IRR personnel requested information about proficiency on each job task at the End of Active Obligated Service (EAOS) and at the present time (NOW). The difference between proficiency at EAOS and current proficiency would reflect skill deterioration during IRR membership.

Questionnaires mailed to active duty STG-3s requested information about current proficiency on job tasks and proficiency expected after 2 years of nonperformance of the job tasks. The current proficiency estimates were needed to define criterion job performance for an active duty STG-3. The data reflecting what is currently done on the job would define an acceptable level of performance. These data could be used as a baseline for judging amount and consequences of IRR skill deterioration. They also set an upper limit on the proficiency levels that training must achieve to maintain at or restore skills to acceptable levels. Copies of these data collection instruments are shown in the next section.

As of 25 September 1984, 341 STGs were listed in Naval Military Personnel Command (NAVMILPERSCOM) computer files as assigned to the IRR. Names and addresses were obtained from NAVMILPERSCOM through the Naval Reserve Personnel Center (NAVRESPERSCEN). Questionnaires were mailed under CNO (OP-11) cover letter on 22 October 1984 to the entire population of 341. Because of a low initial return rate, a follow-up mailing (246) was made on 29 January 1985. Questionnaire returns were accepted until 28 February 1985.

Coordination with Commander in Chief, U.S. Atlantic Fleet (CINCLANTFLT), Commander in Chief, U.S. Pacific Fleet (CINCPACFLT), and within CNO (OP-01) was accomplished for authorization to survey active duty STG-3 personnel. An STG-3 roster, current as of 2 August 1985, was obtained from NAVMILPERSCOM. From a pool of 1,531, a sample of 400 STG-3s was determined using accepted survey research methods. Questionnaires were mailed on 18 September 1985 under CNO (OP-11) cover letter to unit/activity commanding officers for distribution to STG-3s named. Returns were accepted until 31 December 1985. Returned questionnaires were scanned to determine data usability, and data were entered into computer files. Subsequently, summaries of the information of interest to the study were prepared.

RESULTS

Results pertinent to the assessment of STG skill deterioration are presented in this section.

QUESTIONNAIRE RETURN STATISTICS

Table D-16-1 shows, for both the IRR and active duty STGs, the number of questionnaires mailed and number and percent of usable returns. For the

IRR sample, the number/percent of nonvalid returns (nonvalid principally because of data base errors) is also shown. Percent usable returns was derived by dividing the number returned (124) by the number delivered (i.e., 341 - 36 = 305).

Table D-16-1

Questionnaire Return Statistics

Sample	No. Mailed	Usable Returns No.	Usable Returns %	Nonvalid No.	Nonvalid %
IRR	341	124	41	36	11
Active Duty	400	268	67		

QUESTIONNAIRE DATA SUMMARIES

Summaries of data obtained from the questionnaires are presented in table D-16-2 for IRR personnel and in table D-16-3 for active duty personnel. The tables are modified questionnaire forms.

Background Questions

Of 121 IRR STGs answering the question, 22 (approximately 18 percent) reported that they now work in a civilian occupation related to their Navy STG rating. Answers to the remaining two background questions for IRRs (see table D-16-2) are not reported since it was determined that the answers might be redundant and could not be unambiguously interpreted. Of the active duty respondents answering the background questions (see table D-16-3), 251 of 264 (95.1 percent) work in rating. Two hundred and sixty (98 percent) are assigned shore duty.

Task Performance Data

The data summary tables (D-16-2 and D-16-3) show the number (F) and percent (%) of respondents reporting that they had never performed particular job tasks (i.e., they responded to the task description with a "1.") For IRRs, these data refer to the "at EAOS" answers and for active duty to the current (NOW) level of ability. A rank-order correlation (see Siegel, 1956) computed between the two sets of data ($\underline{r} = .804$, $p < .05$) indicated significant agreement between the two classes of respondents. Thus, tasks which have not been performed by active duty STGs (to date) are the same tasks that had not been performed by IRRs at EAOS.

Tables D-16-2 and D-16-3 also show, for each task listed on a questionnaire, mean values for performance proficiency/competency, the standard deviation (SD) around the mean, and the number of cases (n) on which a mean

Table D-16-2

Overall Summary of STG IRR Questionnaire Data

PART 1:

1. If necessary, correct your Service Number.
2. Is the work which you do NOW related to your Navy rating?
   Yes 22 No 99
3. Have you done PREVIOUS work which is related to your Navy rating since your Expiration of Active Obligated Service (EAOS)?
   Yes - No -
4. Have you received training related to your Navy rating since your Expiration of Active Obligated Service (EAOS)?
   Yes - No -

ANSWER KEY:

(1) Have never performed the task.

(2) Can/could do simple parts of the task (need direct supervision).

(3) Can/could do most parts of the task (need general supervision).

(4) Can/could do all parts of the task (need only occasional supervision. Meets minimum local speed and accuracy standards.)

(5) Can/could do complete task quickly and accurately (need no supervision).

PART 2:

For each job task statement below:

A. Indicate your CURRENT level of ability according to the answer key above.

B. Estimate your PREVIOUS level of ability at the time of your EAOS according to the answer key above.

"(1)" Choices					A			B	
N	%		Tasks	N	Mean	SD	N	Mean	SD
8	6.5	1.	Interpret passive/active sonar recorder traces.	122	3.36	1.240	123	4.26	1.165
6	4.9	2.	Operate sonar sensors; perform operational tests and make external adjustments on equipment.	122	3.65	1.239	123	4.43	1.064
14	11.3	3.	Identify characteristics, functions, and effects of controlled jamming and evasive devices on sonar operations.	123	2.98	1.177	124	3.71	1.324
3	2.5	4.	Determine range predictions.	121	3.43	1.132	122	4.39	.949
7	5.6	5.	Prepare and interpret sonar message.	122	3.21	1.192	124	4.13	1.111

Table D-16-2 (Continued)

3	2.4	6. Report, record, detect, and classify contacts; determine: target bearing and range, range rate, target angle, target aspect and Doppler, true and relative motion, and target course.	123	3.74	1.172	124	4.51	.888
8	6.5	7. Recognize major equipment malfunctions.	123	3.55	1.288	124	4.12	1.200
11	8.9	8. Operate torpedo countermeasure equipment.	123	3.63	1.405	124	4.20	1.307
3	2.4	9. Operate pathytnermograph.	123	4.25	1.121	124	4.73	.827
5	4.1	10. Operate tape recording equipment.	122	4.21	1.100	123	4.58	.992
16	12.9	11. Operate underwater battery fire control system.	122	2.98	1.298	124	3.61	1.390
9	7.3	12. Complete supply forms; complete maintenance data forms for: a) completed maintenance actions (MAF), b) deferred maintenance actions, and c) work requests.	122	2.93	1.169	124	3.76	1.245
5	4.0	13. Operate underwater telephone.	123	4.10	1.217	124	4.59	.980
4	3.2	14. Operate Fathometer.	123	4.25	1.221	124	4.65	.911
6	4.8	15. Inspect, clean, and lubricate electromechanical/electronic equipment.	122	3.90	1.269	124	4.40	1.043
7	5.9	16. Perform weapons handling evolutions.	118	3.65	1.277	119	4.28	1.157
		17. What class ship(s) were you on?						
		Overall Mean:		3.62				

Table D-16-3

Overall Summary of STG Active Duty Questionnaire Data

PART 1:

1. If necessary, correct your Service Number.
2. Does your current billet require you to work in your Navy rating?
   Yes 251 No 13
3. What type duty is your current billet?
   Sea 4 Shore 260

ANSWER KEY:

(1) Have never performed the task.

(2) Can/could do simple parts of the task (need direct supervision).

(3) Can/could do most parts of the task (need general supervision).

(4) Can/could do all parts of the task (need only occasional supervision. Meets minimum local speed and accuracy standards.)

(5) Can/could do complete task quickly and accurately (need no supervision).

PART 2:

For each job task statement below:

A. Use the answer key above to indicate your CURRENT level of ability.

B. Use the answer key above to estimate your EXPECTED level of ability after 2 years of not performing these tasks.

"(1)" Choices				A			B		
F	%		Tasks	N	Mean	SD	N	Mean	SD
40	15.0	1.	Interpret passive/active sonar recorder traces.	266	3.29	1.393	256	2.70	1.037
25	9.3	2.	Operate sonar sensors; perform operational tests and make external adjustments on equipment.	268	3.72	1.264	260	2.98	1.083
78	29.3	3.	Identify characteristics, functions, and effects of controlled jamming and evasive devices on sonar operations.	266	2.63	1.312	253	2.17	.982
17	6.4	4.	Determine range predictions.	266	4.05	1.141	256	3.02	1.122
37	14.0	5.	Prepare and interpret sonar message.	264	3.52	1.331	252	2.65	1.012

Table D-16-3 (Continued)

18	6.7	6. Report, record, detect, and classify contacts; determine: target bearing and range, range rate, target angle, target aspect and Doppler, true and relative motion, and target course.	267	3.83	1.141	258	2.88	.979
31	11.7	7. Recognize major equipment malfunctions.	266	3.69	1.336	259	3.12	1.198
52	19.4	8. Operate torpedo countermeasure equipment.	268	3.40	1.466	258	2.85	1.261
19	7.1	9. Operate pathytnermograph.	268	4.41	1.165	259	3.77	1.213
37	14.0	10. Operate tape recording equipment.	265	3.79	1.430	256	3.37	1.351
83	31.2	11. Operate underwater battery fire control system.	266	2.77	1.470	255	2.32	1.190
54	20.1	12. Complete supply forms; complete maintenance data forms for: a) completed maintenance actions (MAF), b) deferred maintenance actions, and c) work requests.	268	2.97	1.305	256	2.41	1.063
41	15.3	13. Operate underwater telephone.	268	3.69	1.432	258	3.09	1.207
34	12.7	14. Operate Fathometer.	267	4.01	1.390	257	3.41	1.320
34	12.7	15. Inspect, clean, and lubricate electromechanical/electronic equipment.	268	3.66	1.387	260	3.27	1.314
44	16.7	16. Perform weapons handling evolutions.	263	3.48	1.370	255	2.92	1.208
		17. What class ship(s) were you on?						

is based. For the IRR sample, table D-16-2, the "A" column reflects current average ability level; the "B" column, EAOS average ability level. For the active duty sample (table D-16-3), the "A" column refers to current (NOW) ability and the "B" to proficiency expected after 2 years of nonperformance of a task.[1] A Pearson Product Moment Correlation ($r = .913$, $p < .05$) computed between task means for IRR EAOS and active duty NOW (current proficiency) values indicated that the IRR members, while on active duty, performed job tasks at competency levels equivalent to those of current job incumbents.

For the IRR group, an overall grand mean for current proficiency was computed over all tasks for the rating. This single number indicates that considering the STG-3 job in its entirety (as reflected by the tasks used) the average IRR member feels that he could now perform tasks of the rating at a level where only occasional supervision would be needed (mean = 3.6).

For the active duty group, means reflecting proficiency on each job task for STGs working/not working in their rating were computed. These are shown in table D-16-4. Again, the expected-after-2-years data are provided for information only.

SKILL DETERIORATION

Table D-16-5 displays task proficiency means for two subgroups of the STG IRR respondents: (1) those who answered that they were now working ("W") in a field related to the Navy STG rating and (2) those who indicated that they were not working ("N") in a related field. Both EAOS and NOW (current) proficiency means are given. These means, as well as those in table D-16-4, were computed from choices of 2, 3, 4, or 5 from the answer key. These choices place proficiency along a continuum from "Need direct supervision" through "Need no supervision."

As mentioned earlier, skill deterioration is reflected by differences between EAOS proficiency and NOW proficiency. In table D-16-5, values preceded by a minus sign represent a decrease in proficiency during IRR membership: current proficiency is less than EAOS proficiency. Values with no signs would have indicated increases in proficiency.

The table shows that STGs who now work ("N") in a field related to their former active duty jobs, compared to the group not currently working in an STG-related civilian job, reported less deterioration in proficiency on 6 of 16 job tasks, and more deterioration on 9 others, Statistical tests (t tests for independent means; see Guilford and Fruchter, 1973) indicated that over all tasks of the rating, the task mean proficiency values for two subgroups were equivalent, both at EAOS ($t = .948$, $p < .1753$) and on current (NOW) proficiency ($t = 267$, $p < .396$).

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[1] These expected-after-2-years proficiency values were not used in subsequent analyses, however, since it was clear that many respondents did not understand the question being asked.

Table D-16-4

Task Mean Values for Two Subgroups of Active Duty STGs

	Not Working ("N")[1]		Working ("W")[2]	
Task	NOW	EXP	NOW	EXP
1	3.000	2.833	3.726	2.909
2	4.000	3.200	3.987	3.142
3	3.200	2.800	3.317	2.593
4	4.100	3.143	4.271	3.185
5	3.571	2.833	3.940	2.818
6	3.556	2.500	4.046	3.030
7	3.857	3.333	4.040	3.322
8	3.833	4.000	3.971	3.223
9	4.750	4.143	4.660	3.936
10	4.444	3.875	4.231	3.692
11	3.500	4.000	3.584	2.838
12	2.571	2.833	3.483	2.739
13	3.833	2.500	4.183	3.356
14	4.286	3.714	4.446	3.705
15	3.625	3.167	4.058	3.549
16	4.000	3.429	3.981	3.233

Composite Mean:	Group W	NOW	3.995
		EXP	3.204
	Group N	NOW	3.758
		EXP	3.269
Overall Mean:		NOW	3.877
		EXP	3.237

---

[1] n = 13

[2] n = 251

Table D-16-5

Task Mean Values for Two Subgroups of IRR STGs

	Not Working ("N")[1]		Working ("W")[2]		Mean Difference	
Task	NOW	EAOS	NOW	EAOS	"N"	"W"
1	3.670	4.495	3.318	4.429	-0.825	-1.111
2	3.796	4.573	3.905	4.750	-0.777	-0.845
3	3.291	4.046	3.200	4.136	-0.755	-0.936
4	3.558	4.495	3.450	4.333	-0.937	-0.883
5	3.467	4.298	3.143	4.364	-0.831	-1.221
6	3.865	4.586	3.857	4.619	-0.721	-0.762
7	3.703	4.287	3.955	4.524	-0.584	-0.569
8	3.966	4.467	4.000	4.700	-0.501	-0.700
9	4.453	4.818	4.333	4.857	-0.365	-0.524
10	4.387	4.747	4.409	4.636	-0.360	-0.227
11	3.195	3.884	3.857	4.381	-0.689	-0.524
12	3.116	3.935	3.364	4.095	-0.819	-0.731
13	4.340	4.742	4.250	4.714	-0.402	-0.464
14	4.411	4.776	4.400	4.762	-0.365	-0.362
15	4.033	4.500	4.619	4.905	-0.467	-0.286
16	3.988	4.500	3.857	4.381	-0.512	-0.524

Composite Mean:	Group W	NOW	3.870
		EOS	4.537
	Group N	NOW	3.827
		EOS	4.447
Overall Mean:		NOW	3.849
		EOS	4.492

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[1] n = 99

[2] n = 22

TIME IN IRR

Table D-16-6 provides a breakdown of STG personnel by time spent in the IRR prior to mail out of the questionnaires. The table also shows mean values assigned for proficiency for 6-month intervals of IRR time, and for those IRRs who have been off active duty more than 3 years. Trends in skill deterioration over time are not apparent.

Table D-16-6

Mean Proficiency Values for STG IRR Respondents by Time Since EAOS

Time (Mos.) Since EAOS	Mean	No. of Cases
0-5	3.95	23
6-11	3.91	12
12-17	3.42	14
18-23	3.69	19
24-35	3.66	13
36+	3.31	31
Overall	3.62	112

COMMENTS AND OBSERVATIONS

Comments and observations on the data are offered here. As warranted, interpretations are made and discussed. These interpretations provide the basis for certain conclusions about skill deterioration and retraining needs. Our conclusions are based on best available data. However, they are subject to validation. The low questionnaire return rates coupled with the uncertain quality of the IRR data base (discussed below) require cautious inferences and limit generalizations. Nevertheless, the results do provide much useful information about the IRR that has not been available previously. They also suggest directions that should be taken with respect to the management and utilization of the IRR resource.

COMMENTS ON DATA BASE

Approximately 11 percent of questionnaires returned were classified as "nonvalid" (table D-16-1). They reflect probable errors in the IRR data base. The nonvalid category included, most prominently, questionnaires returned by the Postal Service as undeliverable (bad addresses). It also

included, but to a much smaller extent, questionnaires returned by respondents with comments such as: "No longer in IRR, returned to active duty, already received final discharge. Retiree recruited from another service, was never on active duty in the Navy." (All information concerning such cases was transmitted to the Naval Reserve Personnel Center on 26 September 1985.) Finally, a very few questionnaires were returned by individuals who refused to provide information and, some, by relatives marked, "Deceased." From the above data, it can be concluded that about 11 percent of the STG IRRs could not or would not be available for a mobilization call.

Questionnaires were presumably delivered by the Postal Service to a number of STGs (59 percent) from whom no information was received. It is likely that many did not respond for reasons such as those cited above--they felt the questionnaire was not applicable. A further group, of unknown size, then would also be unavailable for mobilization because they are not in the viable IRR manpower pool as is currently believed. These considerations prompt a recommendation for review and validation of the STG IRR roster.

Another data base issue that should be examined concerns the amount of time that IRR STG respondents have been away from active duty. This information is given in table D-16-6. Twenty-eight percent were in the IRR for more than 3 years. Two issues emerge: (1) the need for skill upgrading and (2) availability of IRR members. Upgrade training because of new equipment, procedures, or material may be required for this group despite their beliefs (table D-16-6) in their continuing ability to perform job tasks at a fairly high level.

A second consideration concerns the Military Service Obligation (MSO). Those who are liable for a 6- or 8-year MSO (depending on when they entered on active duty) may be involuntarily recalled. Those who are beyond the MSO may only be recalled under existing agreements. If these agreements do not exist, still fewer individuals may be actually recallable for mobilization. The size of the available IRR manpower pool may be overestimated. Again, the recommendation is made that this data base be reviewed and validated if this is not already occurring.

SKILL DETERIORATION

Information directly pertinent to the question of skill deterioration was presented in table D-16-5. In table D-16-5, differences between mean values at EAOS and NOW (current proficiency) are shown. Values preceded by a minus sign represent skill deterioration potentially attributable to time spent in the IRR.

Approximately 18 percent of STG IRRs reported that they now work in a civilian occupation related to the STG rating and the effects of this work experience on skill deterioration will be considered next. As table D-16-5 shows, STGs who now work in a field related to their Navy rating reported less skill deterioration for seven of the STG job tasks and greater skill deterioration for nine others than the subgroup not working in a related field. Taken over all tasks, there does not appear to be a significant difference between the current (NOW) proficiency means for the two subgroups. Thus, civilian STG-related employment did not significantly affect skill deterioration. The tasks on which the greatest amount of skill deterioration occurred are easily identifiable from table D-16-5.

TRAINING NEEDS

While skill deterioration information is of interest in its own right, the more important concern of this study is with determining the need for training IRR personnel prior to a mobilization recall. Thus, the implications of skill deterioration data must be assessed against the criterion of acceptable level of proficiency. This can be done most directly by comparing the current proficiency levels reported by STG IRRs against the levels reported by active duty STG-3s. The task means for the active duty sample can be taken as E-4 criterion performance since they reflect the level of proficiency claimed by the average STG-3 now on active duty. These data set an upper limit on "acceptable" proficiency. Lower levels may also be considered acceptable.

The meaning of specific numerical values reported for task means must be clearly understood before conclusions about skill deterioration or training needs can be addressed. Attention is directed to the "answer key" shown on either table D-16-2 or D-16-3. The answer key shows that a value of "4," for example, represents skilled performance with only a need for occasional supervision. Following conventional practice, we assume that a "4" is reflected by any values between 3.50 and 4.49. A "3" is interpreted similarly. Skill deterioration may be shown by lower mean values for NOW (i.e., current) versus EAOS proficiency. However, the change from EAOS scores may not be sufficient to move the IRR respondents to a lower proficiency category. For example, skill loss on tasks 1 to 6 occurred for the IRRs working in a related field. However, the losses reported on tasks 2, 4, and 6 resulted in the IRRs remaining in the "4" category (see table D-16-5). We would conclude that for these tasks the deterioration is of no consequence insofar as signaling a need for retraining. On several tasks, including 1, 3, and 5, the skill deterioration did move the respondents to the "3" category. Whether this should be a cause for concern requires further consideration.

Table D-16-7 below presents the task mean values reported for current proficiency by IRR personnel who are not working in a field related to the STG rating and also for those who are working in a related field. These values are from table D-16-5. Task proficiency means for active duty personnel working in their rating (taken from table D-16-4) are also shown in table D-16-7. Inspection of the data shows that most values are essentially "4"s. In some cases where current skill level has deteriorated to a lower category of proficiency, the absolute skill value is still comparable to that of the active duty respondents. Even in the worst cases, the scores for IRR members indicate the capability to do most parts of the task with only general supervision. Hence, from these data alone, a fair conclusion is that training of STG IRRs would not be required before mobilization to bring proficiency to an acceptable level.

Table D-16-7

Task Mean Proficiency Values for IRR and Active Duty STGs

	IRR		Active Duty
Tasks	Not in Field	In Field	In Rating
1	3.7	3.3*	3.7
2	3.8	3.9	4.0
3	3.3	3.2	3.3
4	3.6	3.5	4.3
5	3.5	3.1*	3.9
6	3.9	3.9	4.0
7	3.7	4.0	4.0
8	4.0	4.0	4.0
9	4.5	4.3	4.7
10	4.4	4.4	4.2
12	3.2*	3.9	3.6
13	3.1*	3.4	3.5
14	4.3	4.3	4.2
15	4.4	4.4	4.4
16	4.0	4.6	4.1
17	4.0	3.9	4.0

*Probable training needs.

From our assessment, there seems to be no need for extensive retraining or maintenance training of STGs prior to mobilization. The average IRR STG should be able to perform required job tasks at an appropriate level of competency with a modicum of refamiliarization at mobilization. For the most part, this could probably be given by close, corrective supervision while the returnee is performing job tasks.

An additional factor to consider in assessing needs for training, however, concerns time since EAOS. Twenty-eight percent of the STG IRRs in the sample were away from active duty for more than 3 years (see table D-16-6). Subject matter experts who review the data provided here may determine that skill upgrade training is required because of technical changes (e.g., new equipment, materials, procedures) in the field.

VALIDATION OF DATA

Our analyses indicate that the need for training of STG IRRs against mobilization requirements is not great. It would appear that required proficiency (i.e., the level shown by current job incumbents) can for the most part be achieved by familiarization training under direct corrective supervision in quite short time periods for most job tasks. There are no indications that comprehensive retraining for all rating tasks, such as would be provided in a formal school setting (e.g., "A" School), is needed. At worst case, instructional modules for training prospective STG returnees on given individual tasks may be required. Information not readily available to the project staff is needed, however, for firm decisions about the need for training to bring prospective IRR returnees to an acceptable level of proficiency or to maintain their skills at a defined level. We recommend that the information provided by this report be evaluated/validated against a number of other considerations. Resource sponsors would be appropriate to validate training needs.

Data Review

As noted previously, the conclusions generated by the project staff are considered tentative and subject to verification. Generalizations from the data have also been limited because of the small numbers of questionnaires returned and because of suspected IRR data base inadequacies. It is believed, however, that much useful information can be gleaned from the descriptive summaries provided. Most of this information has not previously been available because of the many difficulties inherent in conducting skill deterioration research and restrictions on methods that can be used because of practical considerations. Maximum exploitation of the information that is now available is in order. A complete and accurate assessment of the meaning and action implications of the data should be made by individuals who are thoroughly knowledgeable of technical requirements of the STG rating. The NAVTRASYSCEN, if requested, could assist SMEs in this effort. Areas to be considered in the review/validation process are discussed next.

Review Areas

For our study, SMEs from the ASW Training Center (Pacific) identified the job tasks they thought would be appropriate for returning IRR STG members to perform. Other SMEs may not agree on the list. Resource sponsors should determine if these are indeed the job tasks that an IRR returnee (at mobilization) should be able to perform. Further, a companion decision is required concerning the acceptability of the reported level of competency. Since active duty personnel report that they, on the average, now perform at these levels, these data reflect E-4 criterion performance. Resource sponsors should consider whether less proficiency would be acceptable. If so, attendant training requirements for IRRs with concomitant resource requirements would be lessened. On judging the need for training, task criticality, in terms of personnel or equipment safety as it interacts with recent changes to material, procedures, or equipment, must also be considered.

An additional decision factor concerns plans for utilization of IRR personnel at mobilization. If these individuals will serve as casualty replacements, then a fairly high level of proficiency at recall is desirable. Training, as determined by the study data and by the resource sponsor, should occur prior to recall. If, however, IRR members will replace current active duty personnel in less demanding assignments, then time would be available for receiving units or some especially chartered intermediate activity to provide needed training. Likely, the bulk of this training could be done either on the job or in on-the-job type conditions where IRR returnees could demonstrate their ability to perform job tasks under close, corrective supervision. It is our belief, based on available data that desired proficiency would be achieved relatively quickly on most tasks. Further, while decisions must still be made concerning formal training, either institutional or via OJT, our belief is that this type of training can be limited.

Finally, based on (1) the IRR members' reports of their current relatively high residual levels of proficiency and (2) literature findings that maximum skill loss occurs after about 1 year of nonuse of skills, it appears that skill maintenance training for STGs is not strictly necessary. Again, however, this conclusion must be weighed against planned utilization of recalled IRR members. For example, a casualty replacement scenario would make maintenance training more desirable than other scenarios.

CONCLUSIONS

1. Mobilization planners should be aware that the size of the STG IRR manpower pool may be smaller than believed. Approximately 10 to 11 percent of the pool may not be contactable by mail. An additional segment of unknown size may have already reenlisted and/or not be useful to the Navy for other reasons. A substantial percentage of STGs listed in IRR files could also be beyond the zone of involuntary recall.

2. IRR personnel who work in civilian occupations related to their Navy rating reported less/more deterioration of skills (depending on the task) than STGs who are not similarly employed. A larger sample size is needed for firmer conclusions about the relationship between skill loss and civilian employment.

3. Comprehensive retraining and maintenance training for all IRR STGs may be unnecessary prior to support mobilization. Familiarization training, at recall, consisting of supervised practice may suffice. This conclusion is subject to concurrence by subject matter expert STGs.

4. STG personnel off active duty for greater than 3 years may require training on selected tasks to update skills.

5. Of the 16 STG job tasks for which skill deterioration was assessed, indications are that none will require any concerted training for returning skills to an acceptable level of proficiency prior to mobilization recall.

6. For all STG IRRs, mean values of current proficiency reported compare favorably with those reported by active duty personnel. This finding also suggests minimal needs for retraining.

RECOMMENDATIONS

1. Review, update, and validate the IRR data base content to assure that accurate assessments of the size of the IRR manpower pool are available

at all times. Take whatever other steps are necessary and available to assure continuous updating of the data base.

2. Amend existing procedures where possible to obtain information from IRR members concerning civilian employment. At the very least, obtain this information from those eligible for or receiving bonuses for continued IRR service. Establish proficiency levels for a greater number of IRR STG-3s currently working in a related occupation.

3. Request resource sponsors review the data of this study. Determine if agreement can be reached that the tasks generated by schoolhouse SMEs adequately represent the STG-3 job. Determine that the STG-3 job is, in fact, acceptable as the target performance level for training to support mobilization. Request resource sponsors consider the data of this study against factors such as changes to materials, procedures, equipment used by the rating, criticality of task performance, and mobilization plans for IRR personnel.

4. Consider recalling a sample of STG IRRs to assess their knowledge of current STG-3 job requirements. Use this information to validate the data and conclusions of this study.

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